

UGANDA PROTECTORATE.

ANNUAL REPORT

OF THE

DEPARTMENT OF AGRICULTURE

FOR THE

YEAR ENDED 31ST MARCH, 1918.

Published by Command of His Excellency the Governor.



ENTEBBE:

PRINTED BY THE GOVERNMENT PRINTER, UGANDA.

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DEPARTMENT OF AGRICULTURE.

				<i>P.O. Box</i> <i>No</i>	<i>Telephone</i> <i>No.</i>
HEAD OFFICE	...	...	Kampala	53	15
VETERINARY OFFICE AND LABORATORY	...	...	Kampala	63	14
ENTOMOLOGICAL OFFICE AND LABORATORY	...	...	Kampala	5	25
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EXPERIMENTAL PLANTATIONS:—

- | | |
|-----------------------|-------------------------|
| (1) Kampala. | (3) Kadunguru, Bugondo. |
| (2) Kakumiro, Mubendi | (4) Fort Portal. |
| (5) Simsa, Soroti. | |

ANNUAL REPORT. 1917-18.

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STAFF LIST.

DIRECTOR OF AGRICULTURE:

S. SIMPSON, B.SC., (EDIN.), M.R.A.S.E., N.D.A.

Clerk A. S. WIDGERY.

GENERAL DIVISION:

District Agricultural Officers.

TYRRELL BRUCE.

R. G. HARPER.

L. HEWETT, M.R.A.C.

A. R. MORGAN.

T. D. MAITLAND.

Assistant District Agricultural Officer J. D. SNOWDEN.

BIOLOGICAL DIVISION:

Entomologist C. C. GOWDEY, B.SC., F.E.S., F.Z.S.

Botanist WM. SMALL, M.A., B.SC.

VETERINARY DIVISION:

Chief Veterinary Officer E. HUTCHINS, M.R.C.V.S.

Veterinary Officers.

U. F. RICHARDSON, B.SC., M.R.C.V.S.

W. F. POULTON, M.R.C.V.S.

Temporary Veterinary Officer R. L. L. HART, M.R.C.V.S.

Stock Inspectors.

H. L. LEMON.

H. A. STRAUSS.

Temporary Stock Inspector F. A. POESTKOKE.

Indian Veterinary Assistants.

H. RAHMATULLAH.

FAKHAR-UD-DIN.

FAZAL-UD-DIN-AHMEDI.

CLERICAL STAFF:

Clerks.

J. A. M. D'SA.

J. X. DE MELLO.

W. NORONHA.

J. J. FIALHO.

ANNUAL REPORT
OF
THE DEPARTMENT OF AGRICULTURE,
UGANDA PROTECTORATE,
For the Year ended 31st March, 1918.

Staff.

Mr. E. Tyrrell Bruce, Senior District Agricultural Officer, was on military duty in Europe throughout the year, in the Machine Gun Corps.

Mr. R. G. Harper, District Agricultural Officer, went on leave on the 14th March.

Mr. A. R. Morgan, District Agricultural Officer, arrived from Mwanza on the 25th April where he had been working in connexion with the cotton crop in conquered territory. He went on leave on the 6th August and returned on the 5th November.

Mr. T. D. Maitland, District Agricultural Officer, was acting as Curator of the Botanic Gardens, Entebbe, throughout the year in addition to his other duties.

Mr. Wm. Small, Government Botanist, left on local military duty in the Carriers Corps on the 17th April and was absent throughout the year.

Mr. U. F. Richardson, Veterinary Officer, returned from leave on the 21st April.

Mr. W. F. Poulton, Veterinary Officer, returned from leave on the 2nd February.

Capt. R. L. L. Hart, Veterinary Officer, who was seconded to the East Africa Veterinary Corps in September, 1914, severed his connexion with this Department on the 30th June.

Stock Inspector H. L. Lemon went on leave on the 25th June, but owing to ill-health his appointment terminated on the 21st January.

Stock Inspector F. A. Poestkoke was re-engaged as an additional Stock Inspector on the 9th November.

Veterinary Assistant H. Rahmatullah went on leave on the 25th February, prior to retirement after 20 years' service in the Protectorate.

Veterinary Assistant F. D. Ahmedî went on leave on the 30th July and was absent throughout the remainder of the year.

General.

Owing to the prolongation of both the local and European wars, the prevailing conditions for carrying on trade and agriculture were more trying than in any previous year. Scarcely a skeleton staff was available to carry on ordinary work, whilst many extra duties and responsibilities had to be undertaken to meet the abnormal state of affairs. Weather conditions have been unfavourable as heavy rains were succeeded by an unusually long drought.

Food has, therefore, never been very plentiful throughout the year, and this position has been aggravated by the large demands made on the native population for war service of various descriptions. Labour for work on plantations has been difficult to obtain and a constant shortage of labourers for ordinary plantation upkeep is reported from all parts of the country.

Shipping.

The shipping position has been much better than was at one time anticipated, and regular communications have been maintained between the United Kingdom, India and South Africa. Until the formation of the Homeward Loading Sub-Committee at Mombasa, under the Shipping Controller, the shipment of produce was very erratic and unmethodical. A satisfactory system was eventually evolved depending upon priority goods and sundries. The space allotted to each varied from time to time, but priority cargo consisted chiefly of hides and sisal, but if there was insufficient sisal, cotton could take its place. The sundries space was usually 500 tons divided equally between Uganda and British East Africa.

All cargo for the United Kingdom is registered with the Hon. Chief of Customs, Mombasa, and space is allotted by the Sub-Committee for each steamer. The Director of Agriculture dealt with all local Uganda shipping questions and Uganda sundries space was allocated chiefly for planters' produce, which relieved the local coffee position, and also allowed all rubber and cacao to go forward at once. This has enabled Europeans to keep their estates going under peculiarly trying conditions.

Exports.

From the 1st April a separate Customs Department for Uganda ceased to exist and quarterly statements of exports have been prepared for publication from particulars supplied by the Hon. Chief of Customs, British East Africa and Uganda. The comparative details for the year are given in Appendix No. 12. In Appendix No. 13 is given comparative figures for the last five years.

It is not generally known that Uganda's exports are larger than those of British East Africa.

A table shewing the details of the exports from all ports on Lake Victoria has been prepared and printed in Appendix No. 14.

It will be interesting to note that Jinja is the most important port.

Besides this a table has been prepared shewing the details of exports from internal ports and stations, all of which pass through Jinja. This is given in Appendix No. 15.

In neither of these appendices does inter-port or station traffic appear.

The total exports were valued at £784,693, of which ginned cotton represented 68·445%, hides 9·774%, ivory 5·578%, husked coffee 4·241%, ghee (clarified butter) 2·990%, chillies 2·368%, sim-sim 1·663%, and plantation rubber 1·270%.

The following commodities in order of value each represent less than one per cent:—cotton seed, goat skins, coffee in parchment, miscellaneous produce, goods manufactured, wild rubber, jaggree (unrefined sugar), unginned cotton, sim-sim oil, ground nuts, timber, hippo teeth, castor oil seed, cacao, animals living, raw silk, sheep skins, miscellaneous skins, and goods unmanufactured.

The details of imports are no longer available, owing to the non-existence of a separate Uganda Customs Department.

Cotton.

This crop is by far the most important product of the Protectorate, and it is estimated that 133,530 acres were planted last year by native cultivators. The planting season was a very difficult one, and the crop never had a real chance, with the result that the yields per acre were by far the lowest ever recorded. The main reasons for the extremely poor yields were:—(a) exceptionally wet weather made the clearing of land almost impossible, (b) extremely large numbers of the cotton growing population were called up for war work just at the planting season, which totally disorganised the cotton sowing programme in the most productive cotton growing districts, (c) the staple food crop in the Teso District was a failure owing to the abnormal weather conditions, (d) there was a shortage of agricultural implements.

The early sown cotton thus suffered severely from the continual rains, and as the rains were followed by a drought of exceptional length and severity, in spite of large areas of cotton planted, the bulk of the sowing was much too late to give a normal yield, even under ideal conditions. Under the climatic conditions which prevailed the yields were disappointingly low.

The Sale of the Crop.

Early in the year the Government was advised to face the possibility that no cotton might be shipped for some considerable time, and that this contingency might make cotton unsaleable locally. A carefully considered scheme was then drawn up, under which the Government would purchase the whole crop through the ginning firms at certain fixed prices. Ginning firms were to be paid buying commission, and full charges for ginning, baling, and storing, and the Government would ship the cotton on its own account as opportunity offered. The Director of Agriculture was appointed Cotton Controller for the working of the scheme. When the subject was discussed with the ginning firms they asked that the matter might be deferred to enable them to consult with their principals in Europe. Meanwhile the market value of cotton was rapidly rising, and the shipping facilities were much freer than was anticipated. The consequence was that the ginners stated that they would purchase the crop if the suggested average prices were fixed to the growers. Two Indian ginning firms even went so far as to state that they were each capable and willing to buy the whole crop.

The Department of Agriculture was strongly averse from fixing the prices of cotton to the growers unless the Government bought the crop. However, a Cotton War Prices Ordinance was promulgated and in the remote areas the growers were satisfied, but in the more civilised parts the action of the Government was not understood.

This Department advised the repeal of the Ordinance as very high prices were being paid for cotton in some districts, but an amending Ordinance was brought into operation increasing the prices to growers by Rs. 3/- for first quality cotton and Rs. 2/- for second quality cotton per 100 lbs.

Prices continued to rise, and this brought in large numbers of firms and individuals not usually connected with the cotton trade, who made large and certain profits very quickly. These included over 70 natives who took out cotton buying licences.

The result was the publication of an amending Ordinance to limit the profits thus obtained. There is, however, no evidence to shew that the provisions of the Ordinance had the desired effect. When the original scheme of the Government buying the crop was abandoned no legislation was necessary unless for the protection of growers, by fixing minimum prices.

Cotton Markets.

All cotton is sold in markets or at ginneries. Cotton markets are held at established trade, transport, and productive centres, where it is considered advisable in the interests of the industry. To encourage the erection of cotton ginneries in cotton producing areas, cotton markets are closed as soon as possible when a ginnery becomes established there, unless special local conditions make it desirable to continue them. No promise can be made to close an existing market when a ginnery is erected, which guards against monopoly, or the inability of the ginnery to purchase all the local grown cotton on offer. Ginneries generally follow markets and the policy has been to reduce open markets as much as possible. New markets have never been set up near existing ginneries. The system has worked well in the Eastern Province and had been gradually extended throughout Buganda Province. Some ginning firms, however, objected to markets, and the markets of the Mubendi and Masaka Districts were cancelled, as well as others in Buganda Province. As a result of this it is hoped to establish buying posts next year throughout the country, where continuous purchase of cotton can take place after the opening of the season, and it is expected that this system will still further reduce the number of cotton markets necessary.

Picking of the Crop.

Growers, particularly in the Buganda Province, are realising that the keeping of clean and stained cotton separate is an advantage, but much yet remains to be done in this direction in other provinces. There is a great wastage of cotton everywhere, more especially after the plants are uprooted. All cotton is valuable, and even poor quality cotton is well worth the work involved in picking.

Cotton Exports.

The value of the cotton exports for the year was £537,083 for ginned cotton and £548 for seed cotton (unginned cotton). The total value of the whole of the Protectorate's exports for the year was £784,693 so the predominating item is cotton, representing over 68%. The quantities of cotton exported were 99,395 cwts. of ginned cotton and 282 cwts. of unginned. Practically the whole of the cotton is now ginned in the country.

India is increasing her hold over the cotton industry in many directions, and imported 3,041,507 lbs. of Uganda cotton, valued at £228,256, against 2,589,038 lbs. in the previous year.

The exports of cotton lint, unginned cotton, and cotton seed dominate all other exports from Uganda. Compared with the total value of all other exports for the last five years, the percentages represented by cotton (lint and unginned) and cotton seed are as follows:—

1913-14	....	64·796%
1914-15	....	70·593%
1915-16	....	50·662%
1916-17	....	56·304%
1917-18	....	69·457%

Cotton Ginneries.

There are thirty-three power cotton ginneries in working order, and one press house. Twenty more ginneries are proposed, whilst six estates have power machinery installed for ginning cotton. Large numbers of hand cotton gins are to be found in various parts of the country, but few only are used under certain clearly defined conditions.

Builders of ginneries in the past have erected these factories entirely according to their own ideas, but a Factories Board has now been formed to keep in mind the requirements of public health. The operations of the Board should be extended to include some inspection of boilers and engines.

Government has taken no action with respect to the kind of cotton gins erected, although roller gins are always recommended for first quality cotton, and it is hoped that at least six roller gins will be stipulated for in all new ginneries erected on Government land.

Cotton on Lake Victoria.

The transport of seed cotton on Lake Victoria has now practically ceased, with the result that the amount of stained and damaged cotton has lessened considerably. Local ginneries are well able to handle the whole of the crop, so the stoppage of this traffic at the various ports on the Lake has been a decided advantage. Mjanji will be a closed port for seed cotton after the 31st December, 1918, and Bukakata will be the only open one remaining. Bukakata will be closed as soon as the local ginning facilities in Masaka District will permit.

Specie.

The difficulties of obtaining a sufficient amount of specie year by year to purchase the cotton crop tend to increase. The use of notes is being encouraged, but makes little headway amongst native cultivators. Cotton is a cash crop, and it is sold mainly from January to March of each year. These months are the last months of the Government financial year, consequently stocks of specie are then not in such a liquid condition as at other times. All cotton producing countries have the same difficulty to surmount, and for Uganda it would help matters considerably in this respect if the Government's financial year were made to coincide with the calendar year.

Quality of the Cotton.

The quality of the cotton is maintained and improved by selection work from individual plants on one of the Government Plantations, and the whole of the seed distribution is controlled by the Department. The score card used for selection work is as follows:—

PLANT.—HABIT :		Points.	REGULARITY OF LENGTH :		Points.
Erect v Recumbent	....	2	Very regular	....	10
Compact v Straggling	....	2	Regular	....	5
Early v Late Maturity	....	1	Fairly regular	....	3
RESISTANCE TO PESTS :					10
Insects	....	5	STRENGTH :		
Diseases	....	10	Very strong	....	20
PRODUCTIVITY :			Strong	....	10
Over 60 bolls	....	10	Fairly strong	....	5
Between 40 and 60 bolls	....	5			20
Under 40 balls	....	0	PROPORTION OF LINT TO SEED		
LINT.			25% to 35%		
LENGTH OF STAPLE $1\frac{1}{8}$ " to $1\frac{7}{16}$ "			1 point for each per cent	....	10
5 points for each $\frac{1}{16}$"	....	20	SILKINESS :		
DISTRIBUTION OF LINT ON SEED :			Very silky	....	5
Very uniform	....	5	Silky	....	3
Uniform	....	3	Fairly silky	....	1
Fairly uniform	....	1			5
			Total points		100

Six samples of this season's cotton were sent to Messrs. Wolstenholme & Holland, Liverpool, for valuation and report, which is given below :

No.	Value.	Classification, etc.
1.	31·00d.	Very clean and bright creamy in colour staple 1 5/16" and fine.
2.	28·00d.	Very clean and bright staple 1 3/16".
3.	27·50d.	Clean and bright staple 1 3/16 little wasty.
4.	28·50d.	Clean and bright silky 1 3/16"
5.	28·50d.	Clean bright staple 1 3/16".
6.	29·00d.	Clean fairly bright staple about 1½ mixed with short.

Based on 22d. for July delivery Futures.

In a private covering letter Mr. Charles M. Wolstenholme says:—"No. 1 is most excellent, but of course you are aware that in normal times the demand for cotton over 1 3/16 inches is often erratic if there should be a large crop of Egyptian, Extra American and Brazil. However we should recommend you to go on planting this quality so long as the Uganda crop does not exceed present limits. No doubt your sample was grown under ideal conditions and if planted in quantity without supervision, by the natives, would not give as good a result. If you planted No. 1 there would be plenty of room for depreciation and the result would still be good. We don't like No. 3 The others are quite good. The prices will give you the relative values."

Last season's cottons were examined at the Imperial Institute, and the results will be found in Appendix No. 4. It should be noted that No. 6 last year is No. 1 above this season.

When it is possible to start a cotton selection plantation in Buganda Province much superior cotton will be produced.

Spinning Results.

As in previous years, samples of cotton were sent to Mr. John W. McConnel of the Fine Cotton Spinners' and Doublers' Association, Manchester, who kindly put them through spinning tests. He reports that "We compared your cotton with a sample of the best Abassi, really I believe Voltos, and also with a very good style of extra stapled American. In appearance your sample is very attractive being very similar in shade to the Abassi, but not nearly the dead white of the American. It is, of course, a question of what any particular spinner wants as to whether one colour is more desirable than another. In waste your cotton is practically identical with the American, and these two both lose about 2½% more waste than the Abassi. In yarn the Abassi and American give about the same strength, which is between 10 and 15% greater than that of your cotton, and in the appearance of the yarn the Abassi has a very decided preference. There is not much difference between yours and the American, but yours is a little more free from nep which might be expected from the appearance of the raw cotton. I do not attempt to give you a valuation because in the present abnormal state of the market no figures mean anything. I should suppose, however, that your cotton would command a price higher than that of the ordinary run of American Extras, but not quite so high as that of the particular American with which we compared it, and of course, from a spinner's point of view, it is not nearly so valuable as Abassi, though as a matter of fact that kind of Abassi is now not to be obtained at any price."

Samples were also sent to the Textile Institute, Manchester, which resulted in a very interesting report from Mr. F. Arrowsmith of the Eccles Spinning and Manufacturing Co. Ltd., Patricroft, Manchester, which reads as follows:—

"I have used a little of this style of cotton to mix in with 1³/₁₆ths American and Peruvians. The sample you have asked me to report on is very nice stuff indeed, 1½ staple, but has the usual disadvantage of African cotton to an American user of looking woolly or stringy, an appearance which forces one to think the cotton is softer than it actually is, and also to expect it to 'nep' more in the cards than American would do running at the speed we are able to with comfort for a good American quality of 36s. twist, viz., 160 to 170 RPM of the 50" diameter Card cylinder and turning out about 850 lbs. per card, and this woolliness is hard to get rid of in the Blowing-room. The quality of the cotton however is higher than is really necessary for 36s. twist, ring frames: should judge it would spin well up to an 80s. Mule twist. In appearance through its woolliness it does not compare well with Peruvian, but in its silkiness it is better; through the same woolliness one expects a weaker staple which would probably

be the general verdict—a verdict which without experimenting by running a couple of bales through the whole processes alone, I should neither like to confirm nor deny; personally I do not think it would turn out weak—the same test would show whether it would ‘nep’ unduly at the Card if used alone. Under the microscope the cotton has the appearance of a fine, well ripened, mature fibre.”

Cotton Seed.

The export of cotton seed has been a great difficulty, and many thousands of tons were burnt, the exports being only 44,021 cwts. compared with 109,213 cwts. last year. A little of the seed is delinted. America obtains 149 lbs. of linters for each ton of seed handled, and the extension of delinting plants would be a help in Uganda.

Cotton seed is a valuable product for its oil and cake, and even for manurial purposes. Cotton cake, however, in this climate is inclined to go rancid very easily, but if it were disintegrated into cotton seed meal as soon as possible, Uganda could supply a first class cattle food to British East Africa at a cheap rate. The possibilities of cotton seed being used for the development of both Protectorates are very evident, as thousands of tons are available annually at a nominal price.

Coffee.

Coffee maintains its position as the principal crop on European plantations, and last year the yields were much below the average. Owing to the long spell of dry weather, big yields are anticipated during the coming year.

The coffee industry throughout the year has caused much anxiety. In the first place the shipping position was by no means secure, but this was aggravated by the prohibition of coffee imports to the United Kingdom where the bulk of Uganda coffee had previously been sold. Ultimately the Board of Trade agreed that all coffee which had left estates on 23rd February, 1917, could be admitted into England, and further concessions were made by the issue of permits by the Controller of Import Restrictions, Board of Trade. It would have been more satisfactory, and entailed less correspondence and delay, had the permits been issued locally, but this could not be done.

Ultimately, however, Uganda planters were enabled to ship proportionately more coffee than other producing areas within the Empire, and thus to benefit by the full rates prevailing. Italy, France, India and the South African Union formerly took a fair amount of Uganda coffee, but Egypt and the Soudan were neglected. It is hoped, however, that a market will be found in the latter territories, which are large coffee consumers. The importation of coffee to India was prohibited on the 8th December, so as to help the industry in Southern India, and this closed one of Uganda’s promising markets.

Coffee Advances Committee.

On the 25th August His Excellency the Acting Governor appointed a Committee consisting of the Director of Agriculture (Chairman), The Treasurer, The Land Officer, one member nominated by the Chamber of Commerce, and one member nominated by the Planters’ Association, to consider and report whether (a) any advances were required from public funds to enable coffee growers to tide over the present crisis and to meet recurrent expenditure for the up-keep of their coffee plantations; and (b) if so, to what extent and on what conditions.

The Committee reported that the crux of the whole situation was shipping, and there would be no necessity for advances if the shipping position could be relied upon. Meantime coffee was given the bulk of shipping space, under Uganda sundries, and new markets were looked for in South Africa and Egypt.

During the year no advances were recommended, but it is believed that advances will have to be made in the coming year, particularly in the case of those planters in the outlying parts of the Protectorate.

Kinds of Coffee Grown.

Practically all the coffee grown is *Coffea arabica*, originally introduced from Nyasaland, but the cultivation of this variety is not extending, it being replaced by Bourbon. Bourbon sells for higher prices on the home market, is said to require less pruning, having fewer and stronger branches, whilst the parchment from the older trees keeps its normal size far better than is the case with the Nyasaland variety.

Costa Rica is being grown to a small extent, and is claimed to be a heavy cropper, whilst the produce sells at good figures.

In the more humid parts of the Protectorate the yield of coffee fluctuates from year to year, but an exceptionally dry season has a very marked effect in ripening the bearing wood so necessary for the production of a normal crop.

Many varieties of coffee are under observation by the Department, and the best results at Kampala have been given by *Coffea robusta*. In Appendices Nos. 5, 6 and 7, a detailed examination and valuation of many samples by the Imperial Institute will be found worthy of careful consideration by planters in the more humid parts of the Protectorate.

The area under *Coffea arabica* grown by natives in Buganda Province is decreasing, and more attention is being given to the indigenous *Coffea robusta*.

Pests on Coffee.

The "Variegated Bug" has been by far the most serious insect pest during the year and is proving difficult to control, thereby causing planters much concern.

Coffee leaf disease and "die-back" were the two most serious diseases, especially amongst coffee growing in poor soil, unpruned, overgrown with weeds, or suffering from overbearing.

It is gradually being realised that good cultivation, pruning, and plant sanitation are very necessary for good results to be obtained from coffee. A large and steady supply of labour is absolutely necessary, otherwise neglect of the growing plants is sure to follow, and from this a real recovery can never be expected.

Coffee Exports.

The exports of coffee for the year were 15,362 cwts. of husked, valued at £33,278, and 4,485 cwts. of parchment valued at £6,283, a decrease of 15,774 cwts. husked valued at £48,045, and 12,988 cwts. parchment valued at £26,333 compared with the previous year. The short crop, however, was not entirely responsible for this large decrease, and shipping difficulties account for a considerable proportion.

The destination of the exports for the year is not known, but the following table given by the Hon. Chief of Customs, Mombasa, will be of interest to planters. The distribution of exports of Uganda coffee was as follows:—

	Year 1915-16.	Year 1916-17.
	Value.	Value.
	£	£
United Kingdom	30,844	91,182
United States	—	222
Zanzibar	1,391	2,964
France	—	8,371
Italy and Italian East Africa	1,741	10,115
Arabia	348	211
South African Union	44	4,963
India	325	7,152
Egypt	217	—
Other British Possessions	4	933
Portuguese Possessions	—	5

Rubber.

Para rubber has now become the main crop on large numbers of plantations, particularly in the more humid parts of the Protectorate, and coffee is being grown and treated only as a catch-crop.

The year's exports were 144,727 lbs. of plantation rubber and 9,362 lbs. of forest rubber, valued at £9,965 and £923 respectively.

The export of plantation rubber was double the previous year's output and it is confidently expected that this rate of increase will be maintained.

Other rubbers are neglected, as *Hevea* is proving to be well suited to the prevailing conditions. Growth is slow, but the crop suffers little from pests and diseases.

Tapping results obtained in the Botanic Gardens, Entebbe, and on the Government Plantations, Kampala and Kakumiro are quite satisfactory, whilst the Kivuvu and Mabira Estates are proving the success of rubber on a larger scale.

Last year's local seed supply was very small and poor, otherwise larger areas would have been planted up, but this season a large sound crop is expected, so rubber planting will be able to extend rapidly.

The shipping of the rubber has been satisfactorily arranged, but prices are low owing to the United States restriction of imports and prices. Prices cannot be expected to improve until these restrictions are removed, as the United States are the largest buyers of rubber.

Cacao.

The cacao crop has done badly during the year, and the exports are less than half that of the preceding year, being only 114 cwts. valued at £138.

Insect pests as well as diseases are extremely common and serious; consequently the crop is neglected, and no new areas are being planted up.

Experiments with many varieties are being continued on the Government Plantation, Kampala, in the hope of suitable kinds of cacao being discovered, but it will be some years before it can be definitely stated whether cacao cultivation will be successful in Uganda. The oldest plot of cacao in Uganda, cultivated in the Botanic Gardens, Entebbe, has always given, and still continues to give a payable yield.

Botanic Gardens, Entebbe.

On the 1st April the Gardens were taken over by this Department, and put under the care of Mr. T. D. Maitland as Curator, in addition to his other duties as District Agricultural Officer.

The Indian Gardener was unavailable owing to shortage of Forestry staff, and he has now been definitely transferred to that Department. It is hoped to appoint a successor next year.

It was expected that the office accommodation previously belonging to this Department would have been handed over at the same time, but this was not done, neither was the living accommodation in the Gardens transferred. Many other difficulties had to be surmounted, which will no doubt disappear in time.

All the meteorological work of the Protectorate was taken over also, and some of the collected statistics are given in Appendices Nos. 16 to 21.

The report on the Botanic Gardens is enclosed, giving a full and interesting account of the year's work.

Kampala Plantation.

Attention on this plantation is devoted primarily to economic products of interest to European planters, and complete statistics are kept of the yields.

The nurseries are well stocked, and this facilitates the distribution of large quantities of seeds and plants throughout the Protectorate.

Particular attention is given to coffee, rubber, tea and cacao, as well as to many varieties of sugar-cane.

The Plantation possesses a very varied selection of all crops likely to be of benefit to the country, more details concerning which are available in the enclosed report.

Kadunguru Plantation.

This is primarily a cotton seed selection station, near Bugondo, in the largest cotton growing area.

Owing to adverse climatic conditions the yield of cotton this year was the lowest on record. The other crops cultivated also gave poor returns.

At the end of the year the plantation was closed as previously arranged, and the work will be carried on at Simsa near Soroti, and at Kumi, both of which plantations are more central.

A full report on the work, with the necessary tables of details, is attached.

Kakumiro Plantation.

The usual routine work has been continued during the year, in the absence of European supervision, and the enclosed report shews the results obtained.

Fort Portal Plantation.

There is no particular progress to report on this small experimental station. A short report however is enclosed.

Sugar Cane.

This crop is being gradually extended and large numbers of canes, which are under trial at the Government Plantation, Kampala, have been distributed for planting purposes amongst Europeans, Indians and Natives.

The varieties distributed include, Bourbon, Purple and Yellow, Uba, Sealey's Seedling, Java and B, Nos. 3922, 1528 and 4596.

Several European planters are taking up the cultivation of the crop on a larger scale, but beyond the increase in the manufacture of jaggree, nothing of a more advanced nature is contemplated at present.

This Department has on order from India an improved type of mill for the manufacture of jaggree, but already small plants are working, and the jaggree finds a ready local market. The exports for the year were 851 cwts. valued at £668.

Owing to the food shortage amongst the natives, most of their cane, which is cultivated in very small patches only, has been used as a supplementary food supply, and in this way has been very useful.

Rice.

The area under dry land rice is increasing, and the Department has distributed further supplies of seed.

A new type of husking mill has been ordered from India, and, with increased facilities of this nature, rice will gradually become a more powerful factor in the local food markets.

Owing to the food shortage amongst natives, the rice crop has been extremely useful, and production is being encouraged.

The Bukedi District is the most advanced area at present, and many thousands of plots are grown there annually.

Maize.

Maize production is being encouraged, and further supplies of seed have been distributed. It is mostly grown as a subsidiary food crop by the natives, although the grain-eating tribes are taking an increasing interest in this important crop. Amongst the Baganda maize is chiefly grown for eating green, and as this tribe eats very little grain the extension of maize cultivation is slow in Buganda Province. The other provinces, however, are making fairly rapid strides in maize cultivation.

Wheat.

The Toro District is the principal producing area, and there is much room for extension. Three water-power mills are available for handling this crop, as well as many hand-mills, and the competition for the crop is very keen.

The production in 1916-17 was 1,606 loads of 60 lbs. each, and in 1917-18, 2,066 loads.

The flour is sold chiefly in the Congo.

Kigezi District is producing a small amount of wheat also, but the largest new wheat producing area is the Butoroga Plateau, Mubendi District, where nearly 85½ acres produced nearly 20 tons of wheat.

Experimental plots were cultivated on Mubendi Hill, by the District Commissioner, and yielded at the rate of 654 lbs. per acre. A bushel weighed 68 lbs. so the yield averaged 9·7 bushels to the acre. On milling 52·4% firsts, 31·8% seconds, and 10·8% bran was obtained. The wastage was 5·6% due to an excess of moisture in the grain. The flour is of excellent quality and keeps well.

Experiments are also being conducted on the foot-hills of Mount Elgon.

Pusa wheats have been acclimatised and distributed for planting on the lower levels, chiefly to European planters. The results obtained are quite satisfactory.

Tea.

This is a crop which is expected to do really well in Uganda, and the area increases slowly annually. A good marketable tea is produced by very primitive methods. A report by the Imperial Institute on the tea grown at Kakumiro and prepared by the native overseer, is given in Appendix No. 8.

African Silk Worm.

Since the outbreak of hostilities there has been no demand for the nests.

Two bales of silk have been sent to the Silk Production Committee working at the Imperial Institute, to see if this product can be utilised in England.

The Professor of Textile Industries, Leeds University, is also making experiments, as he believes this material would be of great utility in making the wings of aeroplanes.

Native Food Crops.

Food has never been very plentiful throughout the year, whilst the continued drought made the shortage amount to a famine in some areas. Drought-resisting food crops, such as cassava, are being more largely planted in the drier areas, whilst throughout the whole Protectorate food production is being encouraged on a large scale.

Oil Seeds.

The production of oil seeds, with the exception of cotton seed, makes very little progress, although ground nuts, sim sim, and castor oil plants grow remarkably well. Every encouragement is being given for extension, as ground nuts and sim sim add considerably to the available food supply if required, whilst the former is an exceedingly useful crop to rotate with cotton.

Chillies.

This is a crop of some importance in the Busoga District, and attention is being given to it on a small scale in parts of the Northern Province. The crop is admirably adapted for native production, but prices fluctuate far too much to make it a crop of first importance.

Tobacco.

Tobacco production for export makes little headway, but some success on the Congo market has been attained by a planter in the Toro District.

This is an extremely profitable crop to grow, and it is hoped that greater efforts will be made to supply the local demands, and those of surrounding territories.

Other Crops.

Oats and Barley have been tried in the Western Province, and the latter was a success. Small areas of flax are also being tried, owing to the high prices now ruling. Large numbers of fruit trees have been distributed during the year.

Live Stock.

This is a most important industry, and it is to be regretted that it has not yet been possible to begin a Live Stock Farm for improving the breeds of the various kinds of domestic animals. The need for such a farm is very urgent, and the possible benefits likely to accrue from its establishment would be of far reaching effect on the live stock industry.

Veterinary.

The report of the Chief Veterinary Officer is attached, from which it will be seen that much valuable work has been done on cattle diseases.

Rinderpest was not very troublesome during the early part of the year, but towards the end signs were very evident that it was spreading rapidly and seriously threatening the important cattle centres in the Buganda and Western Provinces.

Entomological.

Insect attacks have been very prevalent on cacao, whilst the Variegated Bug is causing much concern to coffee planters in many parts.

The Entomologist's report is enclosed.

Botanical.

The Botanist has been on active service throughout the year, and I have written a short report on the most important plant diseases of the year which is attached.

Kew and Imperial Institute.

As in previous years, numerous specimens of plants and products have been forwarded to the above Institutions, and some of the reports are given in the Appendices. The Directors are thanked for their help thus given, which is highly appreciated.

The Director of the Chemical Laboratories, Nairobi, gave much assistance in analysing products, and reports on locally made alcohol and so-called "line" are given in the Appendices.

Plant Pests Board.

The work of the Board has been quiescent during the year owing to lack of staff. This is regretted, as much work remains to be done.

The executive power of the Board needs extension, and there is need of a complement of Inspectors.

Kampala Swamp.

The planting of various crops on the swamp makes slow progress, and more money and labourers are necessary if permanent work on a large scale is to be accomplished.

The prisoners reaped 82,752 lbs. of sweet potatoes during the year, compared with 75,365 lbs. in the previous year.

Agricultural Statistics.

These are given in the Appendices, and can only be regarded as approximately correct. Thanks are due to all who have helped in their collection.

Meteorological Returns.

These are given very fully in the Blue Book, and a few only are given in the Appendices.

Conclusion.

The work of the Department has been carried on under great difficulties, as, even under normal conditions, a much larger staff was needed to keep the ordinary routine work in progress.

Agriculture is the mainstay of Uganda, and will repay very quickly any outlay in this respect.

All the members of the staff have worked well, for which I tender them my best thanks.

S. SIMPSON,

*Director of Agriculture,
Uganda Protectorate.*

ANNUAL REPORT

ON THE

GOVERNMENT PLANTATION, KAMPALA,

1917-18.

Meteorology.

During the first six months of the period covered by this Report the weather conditions were admirable except for the usual dry spell in July. These months constituted a long growing period which was followed by an equal spell of dry weather extending roughly from October, 1917 to March, 1918. The average yearly rainfall for the last 8 years is 51 inches so that the rainfall for the year under review is 6 inches below the average. The average number of days on which rain fell for the last 8 years is 166, whereas for the present year it is only 127, being thus 39 days below the average for that period.

The following are the records for the last 5 years :—

MONTH.	1913-14		1914-15		1915-16		1916-17		1917-18	
	No. of days	Inches	No. of days	Inches	No. of days	Inches	No. of days	Inches	No. of days	Inches
April	24	10.16	18	6.60	14	5.60	15	4.68	19	8.63
May	20	5.06	15	3.85	18	4.56	17	4.81	18	8.10
June	13	2.17	16	5.14	14	4.33	17	3.22	12	4.46
July	11	2.61	12	5.43	6	.36	5	.87	3	.23
August	7	.83	14	5.50	10	2.77	15	2.58	14	4.29
September	8	3.50	18	5.12	12	4.52	16	9.46	16	8.58
October	20	1.78	19	5.43	14	5.23	15	4.60	12	5.33
November	20	3.80	26	8.00	18	6.33	12	3.13	4	1.60
December	12	2.96	6	.55	13	3.84	10	5.42	6	.52
January	9	3.63	5	.69	10	.81	13	3.54	8	1.37
February	9	1.63	12	4.90	11	4.90	17	6.14	4	.56
March	20	3.81	15	4.01	15	4.40	7	4.18	11	1.97
TOTALS	173	41.94	176	55.22	155	47.65	159	52.63	127	45.64

The highest maximum shade temperature recorded was 91. This is unusual, 84 to 86 being common. The following are the monthly average shade temperatures for the year :—

Monthly average shade Temperatures, 1917-18.

MONTH.	At 7 a.m.		At 2 p.m.		Maximum Temperature.	Minimum Temperature.	Highest Maximum Temperature.	Lowest Minimum Temperature.
	Dry Bulb.	Wet Bulb.	Dry Bulb.	Wet Bulb.				
April	65.6	63.8	74.1	68.8	76.3	62.0	81.0	60.0
May	65.6	64.2	74.5	70.7	76.4	62.5	80.0	60.0
June	64.9	63.7	73.3	70.6	75.2	61.8	80.0	59.0
July	63.7	61.6	77.5	69.2	78.2	60.4	81.0	59.0
August	64.3	62.5	74.3	67.3	76.5	61.5	82.0	59.0
September	63.9	62.7	74.0	67.7	77.4	61.4	82.0	59.0
October	64.0	62.8	76.4	68.4	80.9	61.0	86.0	59.0
November	65.0	62.3	81.7	74.6	84.4	62.0	89.0	60.0
December	65.5	62.7	80.5	75.1	83.3	61.2	87.0	59.0
January	66.0	63.2	80.0	72.5	83.2	62.2	89.0	59.0
February	66.5	63.9	83.8	73.1	84.7	62.5	91.0	60.0
March	62.5	65.0	80.6	73.5	83.1	63.5	89.0	61.0

Labour.

There was an ample supply of labour for the greater part of the year and at the usual wage Rs. 4/50 to Rs. 5/-.

Nursery.

A considerable number of plants was raised for the Plantation besides those for distribution. The following shews the number of plants and seeds distributed :—

Distribution of Plants.

PLANTS.	SEEDS.				
	Cacao.	Para.	Tea.	Coffee robusta.	Various.
1,500	15,550	14,800	11,650 (28 lbs.)	51 lbs.	24 pkts. 25½ lbs.

Coffea Arabica.

The yields from the various numbered plots were practically nil. This was due primarily to the loss of the young cherries by "bug" attack occurring when they were the size of peas. The cherries after having been sucked simply fell off with the first shower of rain. Those that remained and ripened were "lights." The long rainy growing period also accounted for the absence of crop as there was practically no flowering until August. The long dry spell referred to took place between then and the next flowering in the third week of January. This flowering was a failure because of the lack of rain and what crop the trees are now carrying is the result of another flowering during the first week of March.

The two last flowerings were exceedingly good, nothing like them having been witnessed for the last 2 or 3 years. This was doubtless the result of the long growing spell, which gave rise to a supply of good wood, followed by the long dry spell during which time the wood got thoroughly ripened. By January the condition of the Coffee was serious. They were leafless but for a few leaves at the apices of the branches. The trees made a remarkable recovery, however, after the first good rainfall.

Table shewing the flowering of some of the Principal Plots.

FROM MARCH, 1917 TO MARCH, 1918 INCLUSIVE.

Species of Coffee.	March	April	May	June	July	August	Sept.	October	Nov.	Dec.	January	Feb.	March	REMARKS.
<i>C. arabica</i> , vars	very sparse	..	erratic	sparse	..	good	..	erratic	..	..	very good	..	good	The flowering was best amongst the stumped trees and on the apical growth of the unstumped.
<i>C. robusta</i> , Toro or Congo	normal	..	..	normal	..	very good	..	very good	..	..	very good	..	very good	These flowered profusely on several occasions whilst carrying a heavy crop, in some cases flowering among the young cherries.
<i>C. robusta</i> , Bwamba	normal	..	..	normal	..	very good	..	very good	..	..	very good	..	very good	
<i>C. excelsa</i>	sparse	..	..	..	..	fair	..	good	..	..	good	..	good on individual trees.	
<i>C. liberica</i>	..	..	..	..	..	fair	..	good	..	..	good	..	fairly good	The internodes of this tree are long and it is therefore not such a profuse flowerer as <i>C. Robusta</i> of the same size.
<i>C. eugenioides</i> ?	..	..	..	good	..	..	..	good	..	..	very good	..	fairly good	These have not yet reached their full flowering capacity. A wild coffee from the forest and sparingly shaded. They flowered better than others under Ceara shade.

Stumping.

It was found advisable to stump many of the trees at the beginning of the year especially those which had become all "top." The trees in Plot No. 2 have responded so well to stumping (stumped April, 1915) that they are now the best trees. Half the trees in Plot No. 4 were stumped to the level of the basal primaries, roughly 3', in 1916. They were mostly "divided" trees, having lost their central primaries. This method does not recommend itself, however, as they have become very matted. Stumping is found eventually to be the easier and simpler method of treating the trees as a new tree can be raised on which the more or less hard and fast rules of pruning can be adopted for at least the following 3 years.

This table shews the result of the stumping in six of the plots:—

Number of Plot.	Number of trees in plot.	Total number stumped.	Number alive.	Number dead.
1	716	191	184	7
*2	1169	143	135	8
3	1386	635	627	8
4	724	137	133	4
5	305	101	98	3
6	610	174	166	8

* 50% already stumped April, 1915.

Coffea robusta, vars.

From the table of flowerings it will be seen that these species have flowered exceedingly well, and as a result yields have been good. But for the drought the yields would have been much greater as latterly quite a lot of the crop simply shrivelled up.

The following are the yields from the plots in bearing :—

Coffea robusta.

No. of Plot.	Origin of Plants.	No. of trees in plot.	Dates when planted.	Total yield of parchment.		Average yield of parchment.		REMARKS.
				1916-1917	1917-1918	1916-1917	1917-1918.	
1	Toro or Congo	190	March 1914	381 lbs.	855 lbs.	2 lbs.	4.5 lbs.	Suffered considerably from drought, but have since recovered. Do. Do. Shaded with Castor Oil trees.
2	Local	246	Sept. 1914	Nil	160 lbs.	Nil	10.48 oz.	
3	Bwamba Forest	160	May 1915	Nil	307 lbs.	Nil	1.92 lbs.	

As already stated in last year's Report Plot No. 1 is the most promising of these *Robusta* types and 22 of the trees possessing outstanding features have been numbered. Of these No. 9 is the best, Nos. 4, 7 and 12 are also good. These, especially No. 9, possess a fine bold bean and are otherwise good trees. Beans from the majority of those numbered types have been forwarded to the Imperial Institute for report. Nos. 4 and 9 (Nos. 2 and 3 in the Report) were valued at 80/- to 85/-, and represented a good type of *C. robusta*, whilst No. 6 was considered a wild coffee and valued at 60/- to 65/-. It is clear that a sample taken from the Plot generally, including No. 6 and similar types would considerably depreciate the value of the sample, whereas if these undesirable types were eliminated the sample would naturally be of more value.

Some of these trees are precocious yielders, for instance No. 17 has yielded 5 lbs. 14 oz., No. 6, 5 lbs. 6 oz., and No. 9, 5 lbs. 12 oz.

A number of plots have been planted up with the progeny of these numbered trees with a view to selecting the best types.

Coffea: New Types.

The following table shews concisely the new types of *Coffea* added to our collection, and not included in previous reports.

Experimental Coffeas.

Species of Coffeas.	Origin.	No. of Plants.	Date of Planting	REMARKS.
<i>C. robusta</i>	... Local (Mukono Forest) ...	30	March, 1916	A wild coffee with no marked characters. The beans are small.
<i>C. robusta</i>	... Mubendi (indigenous) ...	8	October, 1917	Not yet fruiting.
<i>C. robusta</i>	... Progeny of tree No. 3, Plot 1	88	April, 1917	These were raised from a tree of dwarf and congested habit. Beans medium size.
<i>C. robusta</i>	... Progeny of tree No. 7, Plot 1	132	do	Raised from a well-proportioned tree with numerous laterals. Beans fairly large.
<i>C. robusta</i>	... Progeny of tree No. 6, Plot 1	132	do	These are from a tree of good habit, throwing numerous laterals. Beans medium size.
<i>C. robusta</i>	... Progeny of tree No. 9, Plot 1	253	March, 1918	This is the boldest type among the <i>C. robusta</i> . Beans large.
<i>C. robusta</i>	... Progeny of tree No. 1, Plot 1	108	do	The parent is a large tree with large round leaves. Beans small but uniform.
<i>C. robusta</i>	... Progeny of tree No. 16, Plot 1	99	do	From a typical tree with medium-sized beans.
<i>C. robusta</i>	... Java. Progeny of tree No. 104 field 25 (1902)	5	March, 1916	Not yet fruiting.
<i>C. robusta</i>	... Java. Progeny of tree No. 78 field 124	15	Sept., 1917	Do
<i>Coffea</i> sp. " <i>Quilon</i> "	Java. Progeny of tree No. 88 field 29A. 20-12-15	21	do	Do
<i>C. congensis</i> var. <i>Chalotii</i>	Java. Field 34. 20-12-15	11	do	Do
<i>C. canephora</i>	... Java. (Bangelan) 1915...	4	March	Do
<i>C. eugenioides</i> ?	... Local (Mukono Forest) ...	720	do	A type resembling Nandi coffee, fruits well and good in the cup. In a wild state free from <i>Hemileia</i> , but attacked when cultivated.

Grafted Coffeas.

Species of Coffea.	Stock.	No. of Plants.	Date Planted.	REMARKS.
<i>Coffea arabica</i> var. "Nyasaland."	Robusta	13	September, 1917	These trees are making good progress.
<i>C. arabica</i> var. "Bourbon."	do	13	Do	Do
<i>C. eugenioides</i> ? ...	do	3	Do	Somewhat slow.
<i>C. liberica</i> ...	do	5	Do	Slow.
<i>C. excelsa</i> ...	do	5	March, 1918	

Diseases.

There has been a fair amount of "Die-back" among the *C. robusta* due to a *Phoma*. It is similar in its effects to *Colletotrichum coffeanum*, Noack., causing a premature blackening of the young twigs in some cases and in others total death. In a number of trees most of the central primaries have been lost, having simply withered up or broken off. This latter result is peculiar. The primary close to the junction of the main stem is often decayed to half its thickness. When this becomes brittle the primary, if carrying a crop, breaks at this point. These may hang for some time being sparingly nourished by the lower half of the cambium which is generally still alive. The primaries without laterals appear to suffer most, the primaries thus being more exposed. Insolation may therefore be a primary cause although parts not unduly exposed also suffer.

Several trees among the *C. excelsa* have been lost from root disease. *Hymenochaete noxia*, Berk. was responsible in one case. In other cases the fungus was indeterminable. The trouble in nearly every case was confined to the taproot and near to the surface. It is very probable that the fungus arose from the soil in which these trees were potted prior to being planted out. It consisted of rich humus from old decayed Palm stumps and from these soil pits *Ganoderma lucidum*, Leys and *Ustilina zonata*, Lev. have been gathered and one or other is possibly responsible for the trouble.

Para Rubber.

A number of tapping experiments were undertaken embracing most of the conservative methods now in vogue. These in every case were carried out on untapped trees. The first lot consisted of 8 different series of 25 trees each. These were duplicated later, with the exception of series 1 and 2, with 50 trees in the series. Two series, 12 and 13, the single cut on $\frac{1}{3}$ and $\frac{1}{2}$ surfaces daily tappings, were substituted for series 1 and 2, the basal V cut. These are the commencement of experiments which will be carried on indefinitely.

The single cut on half the tree is the most favoured system in the East, but even the more conservative system of 1 cut on a third of the tree is favoured by some, allowing for a 6 years' renewal of the bark. The yields from the daily tappings on half the tree (Series 13) is not altogether commensurate with the amount of bark excised when comparing it with the alternate day tappings. The average yield from series 3, 4, 11 and 12 is 12 ozs. per tree at the cost of, on an average, 9" of bark, whilst the daily series No. 13 is 16 ozs. to 1' of bark. The same remarks apply to the 1 cut on $\frac{1}{3}$ surface series in the alternate and daily tappings.

Any remarks regarding the "change-over" system would be premature, that is, regarding these experiments, although it is a system which will no doubt come very much into use. This method aims at the distribution of the wound and at resting the tapped surface during the "change-over."

There are a number of factors to be borne in mind in comparing yields especially over the short period covered by these experiments, and which over a longer period would to some extent be eliminated or modified by more equal distribution. A change of tapper will affect yields, for instance when an experienced one has to be replaced by an inexperienced one. Then again, the number of trees which have ceased to yield from time to time may vary considerably, for example in Series 13 as many as 11 trees did not yield at various times, while in Series 1 only 1 varied. In some cases a few trees did not yield at all and others did not yield for long periods. There is no apparent reason for this as the paring was very uniform. Some series too, as 9 and 10, have suffered from "bark-rot" more than others. All these factors affect yields.

The following are the Records of Yields:—

Para. Rubber.- (Tapping Experiments.)

No. of Series.	No. of trees in Series.	Average Girth Measurement.	No. of days during tapping.	Actual No. of times tapped.	System of tapping.	Average area of bark excised.	Average No. of incisions per 1".	Weight of Rubber in Biscuit.	Weight of Scrap.	Total Yield.	Average yield per tree.	REMARKS.
1	25	20"	346	146	V. $\frac{1}{2}$ surface alternate days.	7-7"	18-9	16 1	4 1	20 2	13	4 years renewal.
2	25	20"	346	147	V. $\frac{1}{4}$ surface daily.	7-9"	18-6	11 15	3 3	15 2	9-6	4 years renewal.
3	25	19-83"	346	147	1 cut $\frac{1}{2}$ surface alternate days.	8-2"	18	19 8	3 7	22 15	14-7	4 years renewal.
4	25	21"	346	152	1 cut $\frac{1}{2}$ surface alternate days.	9-4"	16-17	18 14	2 14	21 12	13-9	Changed after 6 months to opposite side.
11	50	20-75"	321	137	1 cut $\frac{1}{2}$ surface alternate days.	8-2"	16-7	28 5	3 5	31 10	10-1	4 years renewal.
12	50	21"	321	150	1 cut $\frac{1}{2}$ surface alternate days.	9-7"	15-4	32 6	3 6	35 12	11-4	4 years renewal.
13	50	19-5"	309	233	1 cut $\frac{1}{2}$ surface daily.	12-1"	15-6	45 10	4 9	50 3	1 0	4 years renewal.
5	25	20"	346	147	2 cuts $\frac{1}{4}$ surface alternate days.	9"	16-3	20 3	3 11	23 14	15-3	4 years renewal.
6	25	20"	339	151	2 cuts $\frac{1}{4}$ surface alternate days.	10-3"	14-6	18 13	3 8	22 5	14-3	Changed after 6 months to opposite side.
7	25	19-5"	339	147	1 cut $\frac{1}{2}$ surface alternate days.	9-4"	15-6	13 4	2 14	16 2	10-3	6 years renewal.
8	25	19-5"	339	151	1 cut $\frac{1}{2}$ surface alternate days.	9-8"	15-4	13 1	3 2	16 3	10-3	Changed after 6 months to opposite side.
9	50	20-25"	321	137	1 cut $\frac{1}{2}$ surface alternate days.	9-4"	14-5	13 13	2 5	16 2	5-16	Tapped with Souler knife. Suffered from Bark Rot.
10	50	20"	321	140	1 cut $\frac{1}{2}$ surface alternate days.	7-4"	18-9	16 1	2 15	19 0	6	Changed after 6 months to opposite side. Suffered from Bark Rot.
14	50	19-25"	309	231	1 cut $\frac{1}{2}$ surface daily.	12-8"	18-8	34 6	4 2	38 8	12-3	
15	50	21"	143	106	1 cut $\frac{1}{2}$ surface daily.	6"	17-6	7 14	2 8	10 6	12-1	5 years renewal.

NOTE:—The cut in series 15 was opened at 36" above ground, to ascertain whether or not "bark rot" infection would be less at this height. Dry weather has mostly prevailed since the cut was opened, and the experiment therefore meantime nullified.

Diseases.

"Bark-rot" or "thread" disease broke out soon after tapping had begun. It made its appearance first in the block of rubber which was most densely foliated, and which was bounded on the one side by a block of Ceara and on the other by a block of bananas. It broke out later on other trees more favourably situated as regards light and air. Indeed any tree, it is apparent, is liable to infection during the cold wet periods we experience.

Remedial Measures.

The measures adopted were to excise the diseased portions entirely. This makes an ugly wound in the tree especially in cases where the disease is well advanced. In some instances the trees were rested for a few weeks and a fresh tapping cut made 4 to 5 inches lower down. In other instances a new cut was made lower down and tapping proceeded with. In several cases where the rot was excised but a few "threads" inadvertently left the mycelium travelled through the belt of bark to the fresh cut lower down. It in these instances had travelled down the cambial layer, the belt of bark meantime remaining healthy. These excised wounds were tarred or covered with a mixture of Jeyes' and waste oil.

Preventive Measures.

Several solutions were tried, carbolic, carmona and V2k fluid. These were, however, expensive and difficult to procure. The following solution appears to be the most practicable, the ingredients being comparatively cheap and obtainable.

Resin	....	....	....	....	1 lb.
Soap (blue mottled)	....	....	....	....	1 lb.
(Oil) Linseed	....	....	....	....	$\frac{1}{2}$ pint.

The resin and soap are boiled together and when dissolved the linseed oil is added. This is diluted to 8 gallons to which $\frac{1}{4}$ pint Jeyes' is added. Latterly waste oil was substituted for linseed. This mixture was applied to the trees at every tapping by means of a piece of "gunny" and to well above the cut. The cases of "bark-rot" appreciably lessened as a result, but the dry weather set in and largely nullified the effects of the treatment. But as a means of providing a damp-proof covering for the bark and as a medium for a mildewcide the solution is very suitable.

Applications of swamp clay were tried on 2 of the series as a means of protecting the renewing bark. It was applied in the consistency of clay as used in cementing walls and by means of a trowel. An area of $\frac{1}{2}$ in. was left above the cut to allow room for the knife. This material made a very effective covering while it lasted, but it simply fell off after the first heavy shower of rain, and besides the measure is wholly impracticable when dealing with a large number of trees.

Cacao.

The record of yields from the numbered trees is again included here, and in some cases it will seen that there is an increase in the average yield. It is to be feared, however, that this improvement does not apply to the *Cacao* generally as there have been considerable losses from "die-back," *Lasiodiplodia theobromae*, G. et M. and "Canker." As stated in a previous report some of our best trees have been thereby lost. The "canker" is peculiar in its effects, attacking the forks and main stem of the tree. In some cases it is confined to the main stem, which becomes cracked and bulged. Such trees gradually die, the process going on over a lengthy period.

"Mosquito-blight," *Helopeltis bergrothii*, Reut. var. has been serious, and numerous pods have been lost as a result of it. Fires of cotton seed were distributed throughout the Plantation in an endeavour to smoke the mosquitos out but with very little success. The difficulty was in confining the smoke to the trees by this method. A better means of smoking the trees is under consideration.

"Pod-rot" has been prevalent and also attacks of the stem-borer.

Cacao Yields.

Theobroma Cacao Forastero.

8½ years.

13-ft. x 13-ft.

No. of Tree.	RED VARIETY.						YELLOW VARIETY.						
	Previous Records.				Present Record.	Total Yield to Date.	No. of Tree.	Previous Records.				Present Record.	Total Yield to Date.
	1913-14.	1914-15.	1915-16.	1916-17.				1913-14.	1914-15.	1915-16.	1916-17.		
6	27	61	17	61	19	185	1	12	53	44	44	25	178
10	8	9	16	5	10	48	3	28	64	91	30	35	245
16	8	4	26	16	87	141	9	19	10	39	46	151	265
17	19	28	46	1	9	94	11	8	12	20	2	42	42
20	13	5	27	21	—	66	12	4	5	18	—	—	27
21	11	17	25	61	55	169	13	8	11	22	—	—	41
22	11	61	37	56	12	177	14	8	—	—	—	—	8
24	9	7	58	—	—	74	18	2	12	25	14	5	58
26	6	8	4	14	11	43	19	4	44	36	95	181	310
27	4	12	52	41	3	112	23	3	30	122	99	151	415
29	11	44	97	70	40	262	25	9	17	57	5	90	178
31	9	28	46	31	26	140	28	4	73	110	58	43	288
32	2	55	95	47	63	262	30	9	31	13	3	5	61
33	3	8	3	—	—	14	39	1	3	61	15	7	87
34	7	10	24	—	—	41	42	2	—	1	—	—	3
35	8	26	22	7	20	83	43	2	2	3	1	—	8
36	11	12	28	26	88	225	45	8	87	114	67	25	301
37	4	3	36	28	32	93	47	4	30	17	1	3	55
38	7	64	30	90	50	241	49	6	2	51	11	70	140
40	1	27	33	37	20	118	50	4	9	36	—	—	49
41	11	62	—	—	—	73	51	1	20	21	13	—	55
44	2	8	11	4	—	25	52	11	29	34	17	20	111
48	7	44	53	53	65	222	53	14	13	77	22	46	172
55	1	28	84	29	49	191	54	3	12	34	5	1	55
56	4	3	10	48	19	84	58	6	1	41	14	28	90
60	4	5	32	7	19	67	61	4	22	44	39	52	161
62	2	1	78	—	—	81	67	11	79	27	—	9	126
65	4	4	—	—	—	8	68	10	5	84	24	49	172
71	5	5	74	65	102	253	70	6	22	11	6	7	52
72	8	76	54	75	98	311	76	16	—	49	9	7	81
74	15	22	67	33	47	184	79	3	15	19	10	13	60
75	24	21	53	116	123	331	82	46	94	57	5	78	260
80	12	—	—	—	—	12	—	—	—	—	—	—	—
81	14	21	9	—	—	44	—	—	—	—	—	—	—
TOTAL 34	292	789	1297	1094	1058	4474	32	276	817	1378	655	1051	4062
1913-14*	8.6	—	—	—	—	—	—	8.62	—	—	—	—	—
1914-15	—	23.2	—	—	—	—	—	—	25.5	—	—	—	—
1915-16	—	—	38.14	—	—	—	—	—	—	43	—	—	—
1916-17	—	—	—	32.17	—	—	—	—	—	—	20.47	—	—
1917-18	—	—	—	—	31.12	—	—	—	—	—	—	33	—

*Yield for 9 months only.

Theobroma Cacao Calabacillo.

No. of Tree.	RED VARIETY.						YELLOW VARIETY.						
	Previous Records.				Present Record.	Total Yield to Date.	No. of Tree.	Previous Records.				Present Record.	Total Yield to Date.
	1913-14.	1914-15.	1915-16.	1916-17.				1913-14.	1914-15.	1915-16.	1916-17.		
2	34	23	15	52	133	257	46	12	72	67	22	5	178
4	21	37	29	3	44	134	57	2	20	57	11	—	80
5	32	19	8	2	44	105	59	30	34	17	2	—	83
8	2	—	—	—	—	2	69	1	57	71	—	—	129
15	18	22	2	—	6	42	77	1	—	—	—	—	1
87	43	49	80	55	50	277	78	7	—	2	9	22	40
6	150	150	134	112	277	823	6	53	183	214	44	27	511
1913-14	25	—	—	—	—	—	—	8.83	—	—	—	—	—
1914-15	—	25	—	—	—	—	—	—	30.5	—	—	—	—
1915-16	—	—	22.3	—	—	—	—	—	—	35.7	—	—	—
1916-17	—	—	—	18.66	—	—	—	—	—	—	7.33	—	—
1917-18	—	—	—	—	46	—	—	—	—	—	—	4.5	—

Sugar-cane.

Considerable interest has been shewn in this crop and large numbers of canes have been sold to planters and others. The growers are meantime using the canes for food and jaggree. We have, however, a number of good varieties now in the country which will be available at any future time for establishing the sugar industry even if it

be only for internal consumption. The following varieties are growing on the Plantation, Bourbon Purple, Bourbon Yellow, Uba cane, Sealey's seedling, Java cane, No. B3922, No. 4596, D74, No. 1528, &c.

The following is the number of canes sold and distributed :—

						<i>Canes.</i>	<i>Sets.</i>
Bourbon Purple	...	...	...	...	...	329	831
do Yellow	...	...	...	...	...	1,218	200
B. 3922	...	...	...	...	...	2,165	100
1528	...	...	...	...	...	342	
4596	...	...	...	...	...	146	
Uba	...	...	...	...	...	500	100
Sealey's seedling	...	...	...	...	...	135	
Various	...	...	...	...	...	3,836	
						8,671	1,231

Tea.

The demand for Tea seeds and plants exceeded the supply thus shewing that a greater interest is being taken in this crop. It was not possible to keep a complete record of our plot in cropping owing to stress of work but the demand for prepared tea could not be coped with. We can grow an excellent tea in the country and there is no reason why the local demand cannot be met.

The preparation of the leaf was rendered difficult and tedious owing to lack of hand machinery.

General.

Other crops have had our attention, for instance, wheat. Three small plots were laid down during October, 1917 and the results were sufficiently good to warrant further trials. These (3 varieties) are rust-proof wheats from Pusa but all three suffered more or less from the disease.

Native Agriculture.

The three Agricultural Overseers have been more or less continuously on duty in their respective districts instructing the chiefs in the various branches of agriculture which they have taken up. They are interested mostly in Para rubber although many have considerable numbers of cocoa and coffee trees. The following is a census of Para as distributed among the chiefs :—

Census of Para.

Name of County	1 Year	2 Years	3 Years	4 Years	5 Years	6 Years	7 Years	8 Years	9 Years	10 Years	11 Years
KIAGWE ...	426	3,134	554	5,687	3,555	5,737	7,510	242	—	—	280
KIADONDO ...	250	—	190	551	2,126	246	—	6,424	121	1,744	3,160
BUSIRO ...	170	50	205	52	—	1,013	2,745	710	150	2,353	—
TOTALS ...	846	3,184	949	6,290	5,681	6,996	10,255	7,376	271	4,097	3,440

TOTAL 49,385.

The following chiefs have their trees now in tapping :—

KIAGWE DISTRICT :—Hamu M., Sekibobo
Sir Apolo, Katikiro
Eri Nanfumbanbi
Mantenzi Nsibirwa
M. Mumanya
Nuwa Sebunza
H. H. Daudi Chwa, Kabaka.

BUSIRO DISTRICT :—Sir Apolo, Katikiro.
KIADONDO DISTRICT :—H. H. Daudi Chwa, Kabaka.
Sir Apolo, Katikiro
T. K. Musalosalo
Y. M. Omuwanika
Stanislas, Omulamuzi
Andereya R., Kimbugwe.

"Bark-rot" trouble has been reported from time to time among some of these plots. The trees have been treated as far as possible by the overseers.

Visiting these places personally has been out of the question as there is no means of getting about.

T. D. MAITLAND,
District Agricultural Officer.

ANNUAL REPORT

ON THE

GOVERNMENT PLANTATION, KADUNGURU, BUGONDO.

The weather during the past year was remarkable for the high rainfall between April and October, causing an abnormal rise in the level of Lake Kioga, and consequent flooding and destruction of crops in the low-lying areas.

At the end of October a severe drought set in, and continued until the end of March.

The conditions were therefore of the worst possible description throughout the Teso and Lango Districts, and all crops suffered accordingly.

The simsim crop in Lango, and the 'bulo' crop in Teso were both ruined, and this resulted in a serious shortage of food towards the end of the year.

The cotton crop generally has given the lowest yield on record in these districts.

The following tables give the comparative records of rainfall and temperatures for the last five years:—

Rainfall.

MONTH.	1913-14.		1914-15.		1915-16.		1916-17.		1917-18.	
	No. of days rain fell.	Inches.	No. of days rain fell.	Inches.	No. of days rain fell.	Inches.	No. of days rain fell.	Inches.	No. of days rain fell.	Inches.
APRIL	16	9.06	11	3.77	19	8.77	12	6.72	18	11.44
MAY	23	10.24	14	7.50	18	7.52	16	4.51	23	12.12
JUNE	18	7.66	15	5.48	10	2.82	14	6.02	13	2.59
JULY	6	4.49	13	4.73	5	2.09	9	1.06	4	1.30
AUGUST	8	2.52	16	5.18	8	3.55	17	10.37	13	11.00
SEPTEMBER	4	.91	14	7.95	18	5.49	15	7.71	13	5.75
OCTOBER	14	6.11	20	5.85	14	4.43	11	4.98	18	11.84
NOVEMBER	12	3.99	21	11.70	14	9.36	11	7.04	3	1.42
DECEMBER	4	1.88	3	.36	12	3.51	6	3.14	2	.68
JANUARY	4	2.20	—	—	4	.83	10	3.32	2	.26
FEBRUARY	5	1.37	—	—	11	2.25	11	3.47	1	1.05
MARCH	10	3.53	9	6.02	10	3.31	3	1.45	4	1.18
TOTALS	124	53.96	136	58.54	143	53.93	135	59.79	114	60.63

Temperatures.

MONTH.	Maximum.	Minimum	Highest recorded Temperature	Lowest recorded Temperature
APRIL	83.5	No record	88	No record
MAY	83.5	do	86	do
JUNE	82.6	do	88	do
JULY	83.8	do	87	do
AUGUST	82.9	do	86	do
SEPTEMBER	84.3	do	90	do
OCTOBER	84.3	66.1	90	59
NOVEMBER	89.5	62.8	94	60
DECEMBER	89.7	63.1	95	59
JANUARY	90.2	64.1	95	61
FEBRUARY	93.5	65.2	97	61
MARCH	93.0	64.1	99	60

Change of Site.

At the end of the year the Plantation was finally closed down and all experimental work will in future be carried on at the Simsa Plantation.

Cotton Seed Selection and Propagation.

Main Cotton Crop.

The main crop of the Plantation consisted of Sunflower No. 7 and Nyasaland No. 23. The former is the original selection seed, and was obtained from specially selected cotton from last year's crop. The Nyasaland is the product of the first selection made of this variety in 1915-16. The propagation of these two varieties will be continued at Simsa.

Sowing began on June 4th, and finished on August 17th, the total area of cotton sown being 32 acres.

Owing to the unsatisfactory weather conditions much re-sowing had to be done, and the stand of plants during the first few months did not promise well.

During September and October the conditions improved, and at the end of the latter month the plants were bolling well. There was an entire absence of disease.

Other plots to the number of eight were a continuation of last year's selections.

The following table summarises the results :—

Selection Number.	Area in acres.	YIELD.		Total.	Average yield per acre.	Ginning percentage.	REMARKS.
		A Quality.	B Quality.				
		lbs.	lbs.	lbs.	lbs.		
Sunflower 7 ...	10	2,445	750	3,195	319	29.1	Retained
" 10 (20) ...	1	171	70	241	241	27.4	Discarded
" 23 (7) ...	1 $\frac{1}{4}$	254	95	349	278	26.8	do
" 24 (7) ...	1 $\frac{1}{4}$	308	91	399	318	25.3	do
" 16 (18) ...	1 $\frac{1}{4}$	465	102	567	452	29.2	Retained
" 14 (18) ...	1	255	62	317	317	30.5	do
" 13 (18) ...	1	306	75	381	381	29.9	do
" 12 (20) ...	1	406	82	488	488	26.1	Discarded
" 1 (14) ...	1 $\frac{1}{4}$	352	97	449	358	26.3	do
Nyasaland 32 ...	11	2,179	825	3,004	273	30.6	Retained
Individual Selections ...	2	277	147	424	212	—	—
TOTAL ...	32	7,418	2,396	9,814	330		

The numbers in brackets refer to the original selections from which these were derived.

Ginning Out-turn.

The percentage of lint obtained varied considerably according to the district. Tests made in the Office showed a variation of from 25.5% to 30%. The percentage obtained by ginners varied from 27.5% to 30%, with a general average of between 29 and 30%.

Selection Experiment Plots.

Out of 12 plots, 8 have been retained for further experiment. Particulars of these are shown in the following table :—

Variety.	Plot No.	Length of Staple.	Strength.	Regularity.	Percentage of Lint.	Transmission.	REMARKS.
Sunflower ...	1 (14)	1 $\frac{5}{16}$	Very strong	Fairly regular	29.6	Good	A good sample—seed very small.
do ...	2 (18)	1 $\frac{3}{8}$	"	Very "	33.4	"	A good sample—seed very small.
do ...	6 (18)	1 $\frac{1}{4}$	"	Fairly "	31.6	"	Fair sample—medium length.
Allen ...	8 (25)	1 $\frac{3}{8}$	"	Regular	28.5	"	Slight improvement in staple—seed large and heavy.
do ...	9 (25)	1 $\frac{5}{16}$	Strong	"	28.3	Very fair	
Nyasaland ...	10 (30)	1 $\frac{3}{16}$	Fairly strong	Very regular	30.5	Poor	Some short staple—seed small but plump.
do ...	11 (32)	1 $\frac{3}{16}$	Very strong	"	33.5	Very good	Very fine quality.
do ...	12 (32)	1 $\frac{3}{16}$	"	"	31.5	"	A good sample—seed small and well covered.

The numbers in brackets refer to the original selections.

Individual Selections.

Individual selections to the number of 21 were made on the foregoing experiment plots, and these will be propagated on the Simsa Plantation during the coming season.

Miscellaneous.**Rice.**

A small area of rice was sown near to the swamp, but owing to the excessive rains, the land became water-logged, and only a very small crop was harvested.

Small areas of maize, beans and gram were sown for the purpose of obtaining seed for distribution.

The plantation has been managed throughout the year by a native overseer, with monthly visits of inspection by the District Agricultural Officer.

Mr. Harper proceeded on leave early in March, and the writer took over the work of both plantations at the close of the year.

A. R. MORGAN,
District Agricultural Officer.

ANNUAL REPORT

ON THE

GOVERNMENT PLANTATION, FORT PORTAL.

This is situated on the main Kampala—Fort Portal Road, 5 miles from Fort Portal, at an altitude of over 5,000 feet. There is little progress to report as it has only been possible to pay one visit during the year. The work has been carried on entirely by a native headman supervised by the District Commissioner.

Coffee.

This is the main crop and is doing extremely well. 3.67 acres were planted in 1915 and 2.38 acres in 1916. Yields promise to be very good, and insects and other pests have not up to the present done the slightest damage.

Tea.

The small plot of tea planted in 1915 contains a large number of blanks, but the surviving plants to the number of 136 have done splendidly and are being kept for seed purposes. Tea gives every promise of being a crop suitable for Toro, and the area will be extended when opportunity offers.

Rubber.

On the Para plot only 19 trees were surviving at the end of the year, and had made only very slow growth. The plot will be put under tea, and no further experiments will be carried out with rubber on this Plantation.

Other Crops.

A number of *Eucalyptus* and *Grevillea robusta* have been planted and are growing well. *Erythrinus* are a failure.

S. SIMPSON,
Director of Agriculture.

ANNUAL REPORT

ON THE

GOVERNMENT PLANTATION, SIMSA, SOROTI.

The preliminary work of clearing was started in October, 1916, and during the year under review a total area of 40 acres was brought into cultivation.

Owing to the adverse climatic conditions, the yields from all crops were very low, and experimental work was carried out under great difficulties. In this respect it may be pointed out that in the immediate neighbourhood of Soroti, the storms experienced early in the year were of a more severe nature than in other parts of the district.

The abnormal rains, which lasted with only slight breaks until October, were followed by a drought which continued in increasing severity until the end of March.

A severe hailstorm in August did much damage to the early sown cotton, part of which had to be abandoned.

The following table shows the list of crops under cultivation, and respective areas :—

Crops.						Area.
Cotton	...	...	...	...	...	26 acres.
Rice	...	...	...	...	...	3 "
Maize	...	...	...	...	...	2 "
Tobacco	...	...	...	...	...	2 "
Sweet Potatoes	...	...	...	...	...	2 "
Trees, etc.	...	...	...	...	...	5 "
TOTAL						40 acres.

Cotton Seed Propagation.

The main crop consisted of the following selections from the Kadunguru Plantation :—

Number of Selection.	Variety.	Area.
25	Allen	7½ acres
18	Sunflower	15 "
7	"	2½ "
30	Nyasaland	1 "
TOTAL		26 acres.

The total yield of seed cotton was 3,859 lbs., equal to 148 lbs. per acre, and as previously stated, the low yield was due to the fact that parts of the Plantation were destroyed, and much damage done to the remainder by heavy storms.

Owing to the drought no second picking was obtained.

In view of the above facts, no useful purpose would be served by showing the individual yields of each variety.

Ginning Tests.

Trials were carried out at the Rappayi Ginnery in February. Fifty pound samples of Sunflower and Allen were put through the gins, the respective yields of lint being 28·7 and 28·5 per cent.

Further trials were made when the whole of the crop had been picked, with the following results :—

Variety.	Seed Cotton.	Lint.	Percentage.
Allen	1,067 lbs.	297 lbs.	27·8
Sunflower (18)	1,190 „	322 „	27·7
Nyasaland (30)	46 „	13 „	28·2
Sunflower (7)	76 „	21 „	27·6

The poor condition of the crop accounts for the low percentage of lint.

The Nyasaland and Allen varieties will be retained for further experiment. The main crop during the coming season will consist of Sunflower No. 7, together with some of the best selections from Kadunguru.

Other Crops.

Rice.

Three varieties were tried, namely, Nigerian, Indian and Mwanza. The results were very disappointing, as owing to the flooding of the Rappayi River, the plots became water-logged, and later the drought burnt up much of the crop, which was in a very poor condition.

The natives of the district are taking a keen interest in this crop, and the demands for seed have greatly increased during the past few months.

Tobacco.

Planting out commenced in November, but had to be discontinued owing to the drought. About $\frac{1}{2}$ an acre was transplanted, and this held its own until well into February. During the latter month some cutting was done, but the leaves were rather small. In March the plants were in a very poor condition and were rooted up.

The general appearance of the plants showed that the soil of the Plantation is suitable for tobacco growing, and further experiments will be carried out.

Miscellaneous.

A small crop of maize was harvested, and this will be distributed to the natives for seed purposes.

The crop of sweet potatoes was dried, and this has proved most useful for feeding the permanent staff on the Plantation during the general shortage of food in the district.

A large number of Ceylon and Giant Paw-paw have been distributed throughout the district.

Several varieties of trees have been planted out during the year, including *Grevillea robusta*, *Eucalyptus* and *Acacias*; these are all doing well, with the exception of a few which have been attacked by white ants, and these will be replaced as soon as the rains permit.

A small plantation, 3 acres in extent, has been planted with Ensambya trees, and these are showing a good growth.

Stock.

The oxen, 24 in number, have kept in splendid condition, and have been usefully employed as draught animals in the ploughs and cultivators.

One donkey died during the year, and one foal was born.

A. R. MORGAN,
District Agricultural Officer.

ANNUAL REPORT

ON THE

GOVERNMENT PLANTATION. KAKUMIRO, MUBENDI.

As in the preceding year, this Plantation has been in charge of a native overseer, two visits only having been paid by me and one by Mr. L. Hewett, District Agricultural Officer.

The area under cultivation is approximately 35 acres, which includes the oldest *Coffea arabica* in the country, as well as some of the oldest *Hevea braziliensis*, and these facts make the Plantation of some interest and importance.

Rainfall.

The rainfall for the year was above the average but badly distributed, three months shewing less than one inch of rain. The records for the last four years are given in the table below:—

MONTH.		1914-15		1915-16		1916-17		1917-18	
		No. of days on which rain fell.	Amount of rain in inches.	No. of days on which rain fell.	Amount of rain in inches.	No. of days on which rain fell.	Amount of rain in inches.	No. of days on which rain fell.	Amount of rain in inches.
APRIL	...	16	5·18	15	7·39	17	6·77	17	7·01
MAY	...	8	2·86	11	3·48	15	6·13	18	7·77
JUNE	...	10	3·50	7	1·63	5	2·03	11	3·64
JULY	...	9	3·07	5	3·22	8	3·92	4	0·93
AUGUST	...	10	4·95	7	4·62	12	4·67	15	4·74
SEPTEMBER	...	17	6·74	14	4·40	19	10·91	18	11·74
OCTOBER	...	20	8·16	12	8·09	14	7·00	19	11·26
NOVEMBER	...	21	8·71	15	5·22	13	3·44	5	0·94
DECEMBER	...	5	1·11	9	2·59	9	2·97	3	0·44
JANUARY	...	2	0·12	2	0·32	7	2·54	6	3·01
FEBRUARY	...	7	1·46	16	5·95	11	6·22	2	1·43
MARCH	...	12	4·38	9	3·91	8	1·90	9	2·80
TOTALS	...	137	50·24	122	50·82	138	58·50	127	55·71

Coffee.

The total area under this crop is 21·69 acres, and the crop has been a good one, totalling 5½ tons of parchment, or an average of 636 lbs. per acre. The average yield last year was only 280 lbs. of parchment coffee per acre. Particulars of yields from the various plots for the last four years are given below:—

Year planted.	Area in acres.	AVERAGE YIELD OF "PARCHMENT" PER ACRE IN LBS.			
		1914-15	1915-16	1916-17	1917-18
1904	3·68	233	711	369	1,109
*1906	2·11	130	261	159	—
1907	2	347	818	322	785
1910	2	638	1,297	393	1,174
1911	3	200	283	207	484
1912	1·21	880	642	363	168
1913	7·69	99	430	193	371

*This plot of coffee was stumped in 1916, Para rubber having been interplanted in 1915.

All the above coffee is *Coffea arabica* introduced originally from Nyasaland.

The Variegated Bug has been very destructive in some plots, chiefly in the 1912, and the low yield is mainly due to this pest. The Bug has been collected by hand throughout the year, and is still present on all the plots. These insects were so numerous on the 1910 coffee, that the worst portion was stumped this year after the crop was picked.

The Costa Rica variety yielded 21 lbs., but many of the trees never got a good start, and the blanks are being planted up with the same variety.

Coffea stenophylla has almost died out except for 17 trees, and the blanks are being planted up with *Coffea robusta*, which is doing well.

An acre plot of Bourbon Coffee has been planted, but has hardly become established and vacancies are numerous.

A small plot of Nandi Coffee was planted, and this experienced a trying time in the dry hot weather.

Coffea robusta is doing well, and another acre plot has been planted.

Shade Trees.

The *Erythrina umbrosa* has made the best growth and is more promising than any of the other *Erythrinas*. Several of the trees are about to flower, and a local supply of seed should be available shortly.

The *Albizzias* are doing well also, making rapid growth and giving a good shade.

Several other kinds of trees experimented with have made no headway, notably *Gliricidia maculata*, and the Rain Tree, (*Pithecolobium saman*), neither of which thrives at Kakumiro. On the other hand *Grevillea robusta* does splendidly, and is being used as a coffee shade tree, and for wind-belts.

Cover Crops.

The most successful of these is *Tephrosia vogelii*, and is well established in the 1913 coffee. It has not, however, been cut and mulched often enough, but was allowed to grow too woody.

Cassia hirsuta has made good growth, whilst *Leucaena glauca* makes a good cover if kept well cut back.

Rubber.

Three kinds of rubber are cultivated, viz., Para, Funtumia and Ceara. The latter was planted in 1912 and the two former in 1906. The Funtumia has never been tapped. The rubber areas were rather neglected in past years, which enabled the troublesome weed "lumbugu" to take complete hold of the rubber areas. The rubber plots are now clean, and the "lumbugu" appears to have been eradicated at last. The growth of the Para has been somewhat slow in consequence, but the average girth is now 27·8 inches at three feet from the ground. One plot of Para suffered severely from storms, which damaged 13 trees. These were cut out together with a few others which were too crowded.

There has been no tapping since the end of 1916, and no trace of "bark" disease is now evident. Former tappings were purely experimental with the result that bark was used up rather freely, besides which, the lack of European supervision added greatly to the bark wastage.

Plot No. 7 of Para has not been so exposed to storms as the others, and consequently there are no broken trees. The trees were marked out for a single cut to the left over half the circumference, and for twice a week tapping only. This is an economical use of bark, and with 15 cuts per inch only, seven inches of bark will be used per annum. This type and period of tapping has, from recent Ceylon publications, given such good results that it should be useful to try here. Tapping will begin on this system early next year.

In Plot No. 12, a number of trees are to be tapped on 1/3 circumference as before, with 2 cuts to the left 20 inches apart, and tapped twice weekly only. This will allow ample time for bark renewal.

All the Para seed is readily sold locally.

Tea.

The few plants of this crop continue to make good progress. Small samples prepared by hand were favourably commented upon by home brokers. All the tea plants now established are being kept as seed bearers, and as the crop appears to be very healthy and of some promise, the area under cultivation will be extended as soon as young plants are available.

Cacao.

This crop makes no headway here, and is much worse than it was in 1916. There are large numbers of vacancies, but perhaps a few trees will come to maturity. In any case this crop is totally unsuited to Kakumiro.

Cotton.

Two acres of cotton were planted and did very badly as elsewhere throughout the country. The very heavy rains at first and then the long dry spell meant disaster for the cotton crop. It is hoped to develop a quick ripening and shorter stapled cotton for the Mubendi and Toro Districts.

Wheat.

Plots Nos. 4, 6 and 12 of Pusa wheats yielded 41 lbs., 18 lbs., and 28 lbs. respectively. No. 4 yielded by far the best, but the grain was poor and badly filled. The cultivation of this wheat is being persevered with, and seed has been distributed to European planters for cultivation on the lower levels.

Ordinary wheat was cultivated on the Butorogo plateau, the crop being 4,850 lbs. The whole crop was purchased for seed purposes, and 370 plots have been sown.

Rice.

Four plots of various rice seed were tried from Mwanza, and three were a failure, but the "Karundi" gave a yield of 267 lbs.

Native Silkworm Trees, (*Bridelia micrantha* var. *ferruginea*).

These trees have now grown much too close, and thinning out is necessary. The plot is becoming gradually stocked naturally with nests, but the demand for this product completely stopped at the outbreak of war.

Miscellaneous Crops.

Maize, sim-sim, buckwheat, millet, beans and groundnuts are regularly cultivated on the Plantation, and all do well, so that an ample food supply is available for the labourers if required.

Fruit.

All kinds of fruit trees have been planted, and the majority are doing well. The orchard is stocked with limes, lemons, oranges, mangoes, figs, grape-vines, paw-paws, mulberries, pine-apples, avocado pears, etc., and it is hoped to make this Plantation a distributing centre of importance for seeds and plants of the various fruits.

S. SIMPSON,
Director of Agriculture.

ANNUAL REPORT

ON THE

BOTANIC GARDENS, ENTEBBE.

AGRICULTURAL DEPARTMENT,
BOTANICAL DIVISION,
ENTEBBE.

SIR,

I have the honour to submit herewith my report on the Botanic Gardens for the year 1917-18.

The care of the Gardens and the Meteorological work was taken over from the Forestry Department on the 1st April, 1917. It was not found possible to devote to the Gardens all the attention which they demanded as my time was divided between the Gardens and the Kampala Plantation, and monthly, in some instances fortnightly, visits were all that could be paid. However the Gardens were kept up to their usual standard.

Weather.

The weather conditions for the greater part of the year were very trying, the months of June, July and August being exceptionally so. Although good rainfalls were experienced during subsequent months it was very irregularly distributed, with the result that any planting operations which may have been in contemplation were delayed, while on the other hand, the work of mowing, weeding, etc., was made easier.

Nursery.

The stock of plants, both economic and decorative, has been gradually replenished. The stock was low at the beginning of the year, except for the common things, such as crotons, acalyphas, panax, etc. Consequently the distribution of plants was not very considerable.

Lawns.

Some patches of the lawns had to be relaid as the grass had died out. There are several other places which are very bare, especially where the soil is shallow and consisting of gravelly laterite like stone. The "French" or "Madagascar" grass, *Cynodon dactylon*, which was originally laid down to form the lawns has practically all died out, having been replaced naturally by native grasses.

Decorative Trees.

The most conspicuous flowering tree in the Gardens is the "Kifabakasi," *Spathodea nilotica*, Beauv., of the Trumpet family, Bignoniaceae. This is a very handsome tree when in full flower. It flowers at the terminals of the branches in a raceme, and a tree may be clothed, as occurred this year, with its brilliant red and gold flowers for several months. The flowers drop while comparatively fresh, strewn the lawns. When seeding the tree is interesting. The woody pod-like seed-vessel stands erect from the apices of the branches, dehiscing by a longitudinal slit, thus liberating the delicate silver winged seeds, which are borne in every direction by the wind.

Baikiea insignis, Benth. is another interesting tree, heavy foliaged with large white and lemon-coloured flowers (the vexillum is lemon). It is a striking tree also in its fruiting stages, having a long tough woody pod covered with a thick, velvety, chocolate-coloured tomentum. The pods explode on dehiscence, and the large brown beans are shot out for some considerable distance. It is never deciduous and flowers and seeds more or less continually.

Monodora myristica, Dun. "Calabash Nutmeg." The Gardens possess several specimens of this tree. It is of a short spreading habit, well-proportioned, and having large, tough, oblong-obovate leaves. It is remarkable for its unique and handsome flowers which consist of three delicate, undulated and crisped, brown-spotted outer petals, which hang loosely on long peduncles. These become strong and woody when carrying the large globose Calabash-like fruit. The seeds contain a resinous oil, are very fragrant, and burn readily. This tree belongs to the Anona family, *Anonaceae*, but in this genus differing from other genera in possessing crisped and variegated sepals as opposed to the thick fleshy sepals of *Anona*.

Piptadenia africana, Benth. the "Mpewere." This is another out-standing tree in the Gardens, but it is also a common tree throughout the Nyanza region, and indeed throughout Tropical Africa. Some of those in the Gardens have reached a height of about 100 feet. Originally they grew in a forest which used to stretch along the lower part of the Gardens, but which now forms the Para plots. It is a tall white-stemmed tree with a large spreading crown, and looks very majestic standing out in the lawns.

Antiaris toxicaria, "Kirundu," the Incense tree, *Canarium schweinfurthii*, and "Musisi," *Mæsopsis berchemoides* are three other trees prominently set out in the lawns, the first a tall straight-stemmed tree with a small crown, the two latter, more massive.

Pycnanthus schweinfurthii of which there are several in the Garden is like the "Mpewere," originally in the stretch of forest, and is common throughout Uganda. It is a fairly large spreading tree and a member of the nutmeg family, *Myristicaceae*. It has a woody, two-valved pericarp containing a dark purple kernel covered with a pink or red aril. These peculiar fruits are for the most part of the year strewn about the paths where the trees are growing.

These trees which have just been discussed are all indigenous.

Exotics. Of the decorative exotics the "Flamboyante" *Poinciana regia* is one of the most prominent. It is a fine spreading tree but did not flower during the year, although those growing about the Station did.

Grevillea robusta, *Enterolobium saman*, *Melaleuca leucadendron*, *Stryax benzoin*, *Eucalyptus* spp., *Crescentia cujete*, *Araucaria bidwellii* are some of the introduced trees which are in the collection, standing out on the lawns, and which thrive well.

Fruit Trees.

The grafted mangoes from Bombay, which are amongst the most important fruits here, form a group in the old part of the Garden, and consist of the following named kinds, Alphonso, Batli, Pirie, Mulgoba, Borsha. They vary considerably in their

prolificacy and general habit, and also in their fruiting seasons. This last is no doubt an advantageous character. The inflorescences in some individual cases were severely attacked by a mildew which resulted in the loss of considerable crop. The fungus made its appearance while the flowers were in bud and during the dry weather.

Artocarpus uniferum, "Breadnut," of which there is only one specimen, grown in the centre of the Mango group. It has fruited freely during the year, but the tree itself is not a particularly robust one. This tree is labelled "Breadfruit" in the Gardens. It is, however, the "Nut" bearing variety of *Artocarpus incisa*.

Achras sapota, "Sapodilla Plum." These trees are not particularly healthy. One flowered and fruited but the fruits did not mature. It has been manured as the soil conditions are very poor and better results are hoped for.

Nephelium litchi, "Litchi." This tree flowered sparsely during the early part of the year but no fruits resulted. The tree is well developed and roughly 20 feet high.

Cola acuminata, "Cola nut." A row of six of these trees existed beside the Mango group. They were all very miserable looking trees and making little or no progress, so five of them were transplanted to the lower part of the Gardens, under shade and in damp positions where they have already improved.

Eugenia Jambos, "Rose Apple." This is a tree which thrives exceedingly well. It flowers and fruits freely. The fruit is not of much economic value here, but is much relished by birds which carry the fruits about. Consequently the seedlings of the tree spring up in all sorts of places

The fore-going as well as "Loquat" *Photinia japonica*, "Soursop" *Anona muricata*, "Bullock's Heart" *A. reticulata*, "Shaddock" and "Grape fruit," Avocado Pear" *Persea gratissima* and *Psidium cattleianum* constitute the bulk of our fruit trees.

Coffea "Sese Island," var *C. robusta*. This forms a small plot beside the 1905 Para block and is partly shaded by them and a large *Piptadenia* and "Muwafu" growing near by. Like our other *Coffeas* it is subject to *Hemileia vastatrix*, the trees having been attacked by this disease during the beginning of the dry weather. This variety does not offer such good possibilities as many of our *Robusta* types on the Kampala Plantation. The bean varies from small to medium, the trees are lanky due to the shade, and the primaries are slow in throwing out laterals. The cherries when ripe are of a reddish-yellow colour agreeing in this with our "Bwamba" (wild) type.

Cacao.

The late Mr. J. Mahon in Diplomatic and Consular Report No. 588, 1903, page 4 gives the following information regarding the introduction of Cacao into Uganda.

"The two cases of Cacao, *Theobroma Cacao*, sent out here from Kew in August, 1901 have thriven exceptionally well. They arrived during the drought already referred to, and as there could be no thought of planting them out I had them all put in pots, and to shade them had recourse to converting my tent into a greenhouse and it suited the purpose admirably. Whilst there they were attacked by rats, which apparently in pure mischief gnawed the stems of many quite close to the soil. It was not possible to plant out the Cacao until December, 1901. Their progress in nine months permanently planted out has been and continues to be most satisfactory."

These notes may be of interest here as it is not generally known where the original Cacao came from and when. The Cacao at Kew was in all probability raised from West Indian seed.

There are two groups of Cacao now in the Gardens, but Plot No. 1 is of most interest as being the oldest and the original stock and, as already stated, was planted in December, 1901. It consists of 72 trees but 27 of these are refills and the progeny of the originals which have been planted to fill up blanks and to extend the plots. There are some very fine trees among the original ones but some again are poor and "cankered." In other cases the original trunk has gone and has been replaced by a sucker.

These trees have been numbered and the records of yields for the last year have been kept. The plot has been divided into two sections, the one consisting of the

original trees, and the other of those which have been planted at later dates. These yields are given below.

Plot No. 1. Planted 1901.

APRIL, 1917 TO MARCH, 1918.

CALABACILLO.				FORASTERO.			
RED.		YELLOW.		RED.		YELLOW.	
No. of Tree.	No. of Pods.	No. of Tree.	No. of Pods.	No. of Tree.	No. of Pods.	No. of Tree.	No. of Pods.
82	82	4	266	3	104	2	129
80	57	10	57	21	114	11	2
76	19	85	65	20	142	16	68
74	1	14	85	18	206	19	54
9	124	22	312	23	42	27	18
8	54	24	121	36	54	90	0
13	75	31	32	44	4	60	8
12	7	29	3	79	41	—	—
87	9	35	65	1	68	—	—
32	54	64	23	17	16	—	—
30	56	37	26	—	—	—	—
28	5	7	262	—	—	—	—
33	26	—	—	—	—	—	—
39	22	—	—	—	—	—	—
40	27	—	—	—	—	—	—
42	72	—	—	—	—	—	—
16	691	12	1317	10	791	7	279
Average per tree.		43.2		109.7		79.1	
						39.8	

Plot No. 2. Later Plantings.

APRIL, 1917 TO MARCH, 1918.

CALABACILLO.				FORASTERO.			
RED.		YELLOW.		RED.		YELLOW.	
No. of Tree.	No. of Pods.	No. of Tree.	No. of Pods.	No. of Tree.	No. of Pods.	No. of Tree.	No. of Pods.
84	37	68	54	73	35	34	44
71	10	67	96	72	64	61	41
69	15	56	57	66	14	46	82
70	26	48	21	41	58	58	33
65	23	51	6	53	149	57	26
63	11	43	110	50	75	47	50
55	10	—	—	—	—	—	—
49	31	—	—	—	—	—	—
52	34	—	—	—	—	—	—
9	197	6	344	6	395	6	276
Average per tree.		21.9		57.3		66	
						46	

It takes on an average 23 to 25 pods to the lb. of cured cocoa—in some instances less. Taking the average of 25 pods to the lb. it will be seen that from the best series among the old trees, *i.e.*, Calabacillo Yellow, it works out roughly at 4 lbs. per tree, whilst in Forastero Yellow it is only $1\frac{1}{2}$ lbs. The highest from the younger trees works out at only $2\frac{1}{2}$ lbs. per tree in Forastero Red, and less than 1 lb. in Calabacillo Red. To be conclusive, however, these records would require to be taken over a number of years to test the prolificacy of the various types.

These trees have had no special treatment, at least not for many years. The soil conditions are not of the best, being of a lightish clay on the level, and on the slope of gravel and out-crops of stones, and only part of the plot is shaded.

Mosquito Blight.

Helopeltis bergrothii, Reut., var. Scale (*Stictococcus diversiseta*, Silv.), and Pod Rot (*Phytophthora faberi*, de Bary) have been sources of trouble.

Para Rubber.

Hevea brasiliensis, Maulb. Reference to early Reports will show that the Para tree was first introduced to Uganda in 1901. A consignment of plants from Kew came out under the charge of the late Mr. Mahon when he first came to the country. Of this consignment only one survived, and it is still growing in the Gardens. The following table shows the progress the tree has made since planted.

	1904		1906		1907		1908		1909		1918	
H.=height	3 years		5 years		6 years		7 years		8 years		17 years	
G.=girth	H. 21'	G. 0	H. 27'	G. 12½"	H. 30'	G. 17½"	H. 36'	G. 24½"	H. 42'	G. 30"	H. 50'	G. 55"

The tree unfortunately has been out of tapping for some years. Tapping has now been begun on a number of the larger trees including this one, the yields from which are being recorded separately. Further introductions from Ceylon in the form of seeds took place during January, 1904, and these make up the 1904 and 1905 plantings. 33% germination was got from these seeds.

Tapping.

It was somewhat difficult to arrange new systems of tapping as the older trees had been rather severely tapped on the full herring-bone system with as many as 5 cuts. Tapping, however, was commenced on the 1904, 1908 and 1911 blocks, the last being tapped for the first time. After a rest of 6 months some of the 1904 block were brought into tapping on the Basal V system. These trees were being tapped on the full "herring-bone" when they were taken over, and the bottom cut is now the Basal V. These are tapped daily. Later on tapping was begun on the 1908 block, 2 cuts on ½ surface daily, these being the 2 bottom left-hand cuts of the herring bone.

Previous records from the older trees tapped on the herring-bone system gave a yield on an average of 3 lbs. per tree. At the expense of only ½th roughly of this bark, i.e., the Basal V system, 2½ lbs. were got. The system of tapping on the 1908 block might be considered extravagant taking the single cut alternate day tapping as a criterion, but the renewal of bark generally has been exceedingly good allowing for returning to the renewed bark in 4 to 5 years and resting the trees during dry periods.

The following table gives the yields and various data regarding the tapping.

No. of Series.	Number of trees in Series.	Date when Planted.	Average girth at 3'.	Actual number of times tapped.	System of tapping.	Average area of bark excised.	Average number of parings per in.	Weight of rubber.	Weight of scrap.	Total weight.	Average yield per tree.	REMARKS.
								lbs. oz.	lbs. oz.	lbs. oz.		THE NUMBER OF NON-YIELDERS IN THE SERIES WAS NIL.
1	100	1911	22"	80	1 cut on ½ surface alternate days.	5'9"	13.5	32 10	8 3	40 13	6.4 oz.	Records from 11th September, 1917 to 31st March, 1918.
2	100	1911	21"	160	1 cut on ½ surface daily.	10'2"	15.7	73 1	9 4	82 5	13.17 oz.	do
3	49	1904	40'4"	160	V cut on ½ surface daily.	7'4"	21.4	114 4	9 6	123 10	2.52 lbs.	do
4	100	1911	20'5"	65	1 cut on ½ surface alternate days.	5'1"	12.7	22 4	3 5	25 9	4.09 oz.	Records from 1st October, 1917 to 31st March, 1918.
5	100	1908	31'75"	84	2 cuts on ½ surface daily.	6'4"	13.6	98 9	10 4	108 13	17.41 oz.	Records from 11th December, 1917 to 31st March, 1918.

There is, it will be seen, a considerable difference in the average number of parings per inch got in the various series. This disparity is greater comparing the

older with the young trees, and this is due largely to the ready wound response on the renewed bark of the older trees. Taken generally the tapping is very good, the trees having suffered little or no injury.

Diseases.

Root fungus has given some trouble during the year both amongst the old and young trees. The first root trouble occurred during 1911 in the 1905 block, one tree being lost. The trouble arose again this year in the same spot. It broke out also among the young trees in the 1911 block in various parts, the trees becoming almost irreparable before anything amiss was noticed. The fungus undoubtedly originated on old stumps as this part in which the Para are planted was originally forest. No fruiting bodies of the fungus, whereby it could be identified, were observed, but on one badly affected tree the bark to a foot above the soil was slightly prised open by a thick felted mass of mycelium.

No "Bark Rot" has broken out. This is interesting as these trees have been in tapping longer than any others in the country, and "Bark Rot" has broken out in various places on newly tapped trees.

Meteorology.

The Meteorological Records from the various Meteorological Stations in the Protectorate from January to December, 1917, are attached.

I have the honour to be, Sir,
Your obedient Servant,

THE DIRECTOR OF AGRICULTURE,
KAMPALA.

T. D. MAITLAND,
Curator.

ANNUAL REPORT OF THE CHIEF VETERINARY OFFICER.

Staff.

During the greater part of the year the Veterinary Staff on duty consisted of one Veterinary Officer, one Stock Inspector and two Veterinary Assistants.

Diseases of Cattle.

Rinderpest.

BUGANDA AND WESTERN PROVINCES.

No outbreaks occurred in these Provinces during the year. In October, in view of the spread of rinderpest in Bunyoro, all the cattle in Buganda within 20 miles of the boundary of Bunyoro were moved southwards.

EASTERN PROVINCE.

Numerous outbreaks occurred during the year in the Bukedi District. In Pallisa County 1,872 cattle were reported to have died during the month of October.

In Busoga numerous outbreaks were reported in the neighbourhood of Iganga, one herd of 150 head was reported to have been completely wiped out in August.

In the Teso District where Stock Inspector Strauss was stationed from June onwards, losses were not heavy although localised outbreaks occurred in the Counties of Kumi, Usuku, Bukedea, Serere and Soroti.

All the transport cattle in Teso and in Bukedi were actively immunised, deaths during the reaction were negligible. Bullock transport in these districts was therefore carried on without interruption throughout the year.

Rinderpest was reintroduced into Lango in June from the Northern Province and soon became extremely widespread throughout the district. Many thousands of cattle are reported to have succumbed. The epidemic died out by the end of December. In September the acting District Commissioner reported as follows:—

"2. Hearing in July that rinderpest had broken out among the buffalo in Bunyoro, I caused inquiries to be made at Atura and in the neighbouring area, and as a result of these inquiries learned that in June an Indian Trader had imported

some undried hides from the Gulu District, where rinderpest was rampant, to Atura, where prior to that date rinderpest was non-existent. The Indian has since been prosecuted and convicted to the maximum fine, and it became clear in the evidence that not only was the local outbreak of rinderpest due to this breach of Ordinance, but that where his own cattle died, which they did before any of the local herds were infected, he procured natives to skin the animals and distributed the infected meat as a reward. The loss of approximately 350 head of cattle which have died in that region can be directly attributed to this infringement of the Ordinance. No ox transport is working between Gulu and Atura.

"3. It would appear to be clear that rinderpest was introduced into Bunyoro via Atura, as there is no disease South of the River Koli along the Nile, but the method by which it was introduced is not so clear. Had it been introduced by the importation of goats and sheep, it would be natural to presume that the cattle in Bunyoro would have been affected before the buffalo, and the same argument invalidates the hypothesis that some of the infected meat which was distributed at Atura found its way across the Nile.

"4. I am given to understand that the bush-pig is also liable to be infected with rinderpest, and in view of the fact that the bush-pig is known to swim the Nile I venture to suggest this animal as the possible medium of infection. Of its ability to swim the Nile I have ample proof, as its numbers have been increasing rapidly on the East bank of the Nile and they have been seen swimming across from Bunyoro. In the event of their becoming infected with rinderpest, nothing seems more likely than that they should try to avoid the scourge by returning to the West bank, thus carrying the disease to the buffalo."

As the result of my investigations at Panyadoli in July, I consider that rinderpest was introduced into Bunyoro from Atura through the medium of game.

The following cattle were double-inoculated by Stock Inspector Strauss with virulent blood and serum in the Eastern Province.

In the Bukedi District	...	...	...	..	202
In the Teso District ...	...	...	...	...	1,818
TOTAL					2,020

Losses during the reactions were extremely low.

In addition to the above 807 cattle and 92 calves were inoculated with serum only at Jinja prior to export to British East Africa and 87 in Busoga with virulent blood and serum.

NORTHERN PROVINCE.

No outbreaks of rinderpest occurred in the West Nile District but the disease was prevalent during April, May and June in the Districts of Gulu and Chua.

In Bunyoro the buffalo were reported, early in July, to be dying near Panyadoli on the West bank of the Nile, opposite Atura in Lango where a number of cattle had died from rinderpest in June.

From this original centre at Panyadoli the infection spread southwards through the game and large numbers of buffalo, bush-buck and bush-pig died. In October buffalo migrated southwards, out of the infected area North of the Titi river, as far as the Kafu, the boundary between Bunyoro and Buganda.

The epidemic has extended steadily along the Kafu valley. Buffalo, bush-buck, bush-pig, wart-hog, cobus cob and reed-buck are reported to have died in large numbers also oribi and water-buck.

From Panyadoli the epidemic also spread in a westerly direction through the depopulated Sleeping Sickness areas in Northern Bunyoro and appeared amongst the game on the shore of Lake Albert at the Sonso River near Butiaba in February, 1918.

Up to the end of March the epidemic in Bunyoro was confined to the game in the tsetse fly areas.

In November recommendations were made by me that Dr. H.L. Duke, the Bacteriologist, should take advantage of this opportunity of investigating the question as to whether rinderpest in game causes any diminution in the numbers of *glossina morsitans*.

These investigations were commenced later in the year.

Trypanosomiasis.

• Deaths from trypanosomiasis amongst cattle in the Mengo District were not quite so heavy as in past years though outbreaks occurred amongst the herds in the Nyanja valley in Buruli, Bulemezi and Singo, also in Gomba, Bugerere, Kiagwe and

Kampala. One trader working transport between Kampala and Luwero lost 21 out of 25 oxen from *T. Pecorum*. Ten oxen working between Mityana and Port Bell were also found to be infected.

In the Masaka District 80 out of 108 transport oxen owned by Indian traders were found to be infected with *T. Pecorum*, these oxen were working between Masaka and Bukakata. *Tabanidæ* especially *Tabanus Africanus*, were found to be extremely numerous on this road in June and the infection appears to have been spread mainly by these flies.

In August Mr. Richardson found 11 out of 30 cattle, owned by the White Fathers' Mission at Kitovu near Masaka, to be infected with *T. Pecorum*. Heavy losses from trypanosomiasis were reported amongst the herds near Lake Kachera in Koki and Kabula.

Several cases of trypanosomiasis were found in cattle brought from the Mubendi District for sale in Kampala.

In Toro, cattle were found to be infected with *T. Pecorum* on the Kiankoba Estate near Isunga where *Glossina Fusca* were found.

In Ankole Mr. Richardson found that trypanosomiasis was causing very considerable losses amongst the herds in the Counties of Nshara, Ishingiro, Ruampara and Kazara.

In Bunyoro a large proportion of the herds near Butiaba were found to be infected. Owing to the rise in Lake Albert and the consequent flooding of their usual grazing areas these cattle appear to have been sent for grazing into the adjoining tsetse fly areas.

The majority of the cattle in the eastern half of the Kafu valley are reported to have died from trypanosomiasis during the past three years.

In Busoga no outbreaks of trypanosomiasis have been reported amongst the transport oxen working between Jinja and the Mpologoma since the old road by Batumbogwe, on which *G. Pallidipes* were found in 1916, has been closed for cattle transport.

Treatment of Trypanosomiasis.

49 cattle infected with *T. Pecorum* were treated. Of these 23 died, 10 recovered and 16 were still under treatment at the end of the year. 12 cattle infected with *T. Vivax* were treated, of these 4 died, 7 recovered and one is still under treatment.

One dairy cow infected with *T. Pecorum* was treated with subcutaneous injections of Soamin, a dose of 5 grammes was given at intervals of every 10 days. The first injection was given on the 26th June and the last on the 20th December. Daily examinations of fresh blood slides were made throughout this period and trypanosomes were found on the 24th, 25th and 26th of June, on the 4th, 12th, 14th and 23rd July and on the 15th August. This cow made a complete recovery and remained in milk up to December.

No bad effects were experienced by those who consumed this milk.

An experiment was made to ascertain whether the virulence of *T. Pecorum* for cattle could be reduced by passage through goats.

A virulent strain was obtained and sub-inoculated through four goats and then into a young bullock but no modification in virulency resulted. The bullock died from trypanosomiasis on the 40th day after inoculation.

Transmission.

In Kampala outbreaks of trypanosomiasis occurred amongst the station cattle in May, June, July, September, October and January.

During these outbreaks trained fly boys were employed to accompany the cattle while grazing throughout the day but the only biting flies obtained in any numbers were *stomoxys Calcitrans* which were extremely numerous.

A day's catch made in September by one boy between 9 a.m. and 3 p.m. was:—

Stomoxys	...	...	...	...	600
Hæmatopota Ugandæ	...	...	...	...	1
Tabanus Pap	...	...	...	...	1

Similar results were obtained in 1915 and 1916. I consider that in Kampala *stomoxys* are the flies most concerned in spreading *T. Pecorum* and *T. Vivax* from infected to healthy cattle.

Recommendations were made to the Kampala Township Authority, and brought into force, with the object of improving the areas available for grazing within the township and minimising the risks of station cattle becoming infected. Nakasero and Kampala have been reserved for the grazing of station cattle and Kololo for traders' and butchers' cattle. The grazing on Nakasero has been much improved by clearing

away a great deal of the scrub, weeds and elephant grass with which the lower slopes of the hill were covered. The numbers of *stomoxys* have, mainly in consequence of this, been markedly reduced.

A new tsetse fly area was found by Dr. Collyns in Buruli extending from Nakikoma as far as Bumoni in Butengeza.

A hitherto unlocated *glossina Morsitans* area has been found by Stock Inspector Poestkoke in Bunyoro near the Waki river on the main road between Hoima and Butiaba.

In Ankole *Morsitans* is reported to be spreading northwards towards Mbarara on the Massa plains.

In the West Nile District *Morsitans* was found to be very numerous in the bush country from Mutir as far as the Escarpment but the road from Arua *via* the port at Panyamur passes through fly-free country.

East Coast Fever.

Some deaths from East Coast Fever amongst transport oxen working between Soroti and Lali occurred.

This disease is not uniformly endemic in the Teso District and the non-endemic areas require more accurate mapping out.

East Coast Fever is reported by Mr. Richardson to be endemic in the Kigezi District. It is probably not endemic in the West Nile District.

Construction of the Kampala cattle dip was commenced but was not quite completed by the end of March. This dip is constructed on the model of the British East African type of tank. The dip is sited on the Township boundary close to the Bombo road and in a central and convenient position.

Anaplasmosis.

Several deaths from *Anaplasmosis* occurred amongst cattle in Kampala. These cases were probably relapses caused by "fly worry" from *stomoxys* which were extremely numerous here during the wet season.

Foot and Mouth Disease.

This disease was prevalent in June, July and August on the Mbarara—Masaka road. Mr. Richardson found some cases amongst the herds in Kigezi District in September.

Mild outbreaks occurred in Entebbe and in Bulemezi and in Singo.

An outbreak was reported in the South-east Division of the Bukedi District in November.

Tuberculosis.

Several cases of tuberculosis have been diagnosed at the Kabete Laboratories amongst cattle sent from Ankole for the production of anti-rinderpest serum.

One of the Kampala Municipal oxen which had been purchased in Bukedi was found, on post mortem examination, to be infected. There were extensive and typical lesions and the diagnosis was confirmed by the finding of the Tubercle Bacillus.

This was the first case which I have seen in Uganda, but I do not consider that it is the first which has occurred and it will probably be found that this disease is by no means uncommon in Ankole.

Malignant Catarrhal Fever.

One case of this disease occurred in Kampala. The symptoms bore some resemblance to those of rinderpest but blood taken from this case and inoculated into a bullock susceptible to rinderpest caused no reaction.

Ulcerative Stomatitis.

Several cases of this disease were noted amongst calves in Kampala.

Bovine Streptothricosis.

An outbreak of a dermatitis occurred in a dairy herd in Kampala. The skin lesions were very numerous and appeared in the form of circular necrotic areas. A *Streptothrix* was found in smears from these lesions and the diagnosis was confirmed by the Acting Veterinary Pathologist, Kabete.

Diseases of Equines.

Ulcerative Lymphangitis.

Six cases of ulcerative lymphangitis in mules were reported; five of these were treated with the vaccine supplied from Kabete and two were cured.

No cases of epizootic lymphangitis were reported.

Diseases of Sheep and Goats.

In the Masaka District heavy losses amongst goats from scab were reported. The District Commissioner, Bukedi, reported that since 1916 in North-east Bugishu not less than three-quarters and possibly four-fifths of the goats in that Division have been wiped out. Sheep do not appear to have been affected.

The disease is known to the natives as *Kikwiya* (scab) and appears to have been complicated with goat-pox. Goat scab has been very widespread in the Teso. District also of late years.

Diseases of Dogs.

34 cases of *Piroplasmosis* were treated in Kampala. The District Commissioner, Bukedi, reported in October that there had recently been some disease in the North-east Bugishu Division which had killed off native dogs and jackals but that so far as could be ascertained the symptoms shewn bore no resemblance to those of rabies.

Exportation and Importation of Cattle.

881 cattle were exported from the Buganda Province and 133 cattle from the Eastern Province to British East Africa.

192 transport oxen were imported from British East Africa into the Eastern Province.

Legislation.

The Diseases of Animals Ordinance, No. 13 of 1917, came into force on the 1st January, 1918. This repealed the Cattle Disease Ordinance, 1902, the Rabies Ordinance, 1913 and the Cattle Disease (Amendment) Ordinance, 1913.

The existing quarantine regulations were embodied in the Diseases of Animals Rules, 1917 and came into force on the same date.

The Branding of Stock Ordinance became law on the 1st January, 1918.

The movement of cattle except under a veterinary permit is prohibited in the Northern Province, Eastern Province and the Mengo, Entebbe and Mubendi Districts of the Buganda Province.

I wish to record my best thanks to the Administrative Officers for their assistance in issuing the permits in their several districts.

Kampala Slaughter House Returns.

FROM 1ST APRIL, 1917 TO 31ST MARCH, 1918.

MONTHS.				ANIMALS EXAMINED.						CONDEMNATIONS	
				Cattle	Sheep		Goats			Carcases	Parts
					Male	Female	Male	Female	Wether		
APRIL	...	...	...	50	25	24	78	109	—	6	41
MAY	...	...	...	46	24	10	48	116	—	3	41
JUNE	...	...	...	42	20	9	55	69	—	2	34
JULY	...	...	...	50	25	12	66	73	—	4	37
AUGUST	...	...	...	53	11	21	37	107	—	5	34
SEPTEMBER	...	...	...	57	11	12	34	92	—	4	49
OCTOBER	...	...	...	56	17	16	51	101	—	4	50
NOVEMBER	...	...	...	56	4	—	32	19	4	4	40
DECEMBER	...	...	...	58	8	—	30	1	11	5	44
JANUARY	...	...	...	69	13	3	10	4	3	11	53
FEBRUARY	...	...	...	52	23	5	61	11	13	6	40
MARCH	...	...	...	53	24	6	68	19	9	7	45
TOTAL				642	205	118	570	721	40	61	508

Summary of Slides Examined, Kampala.

CATTLE.					
Trypanosomes	...	463	Lymphangitis	...	1
Blue Bodies	...	4	Staphylococci	...	1
Filaria	...	4	Bacillus Proteus	...	2
Piroplasma	...	10	Bacillus Mecrophorus Bang.	...	6
Bacteria	...	11	Streptothrix	...	5
Anaplasma	...	7	Unidentified Bacteria	...	8
Bacillus of Tuberculosis	...	13	Negative	...	9,011
Anthrax	...	2			

DOGS.					
Trypanosomes	...	20	Filaria	...	6
Piroplasma	...	38	Negative	...	235

MISCELLANEOUS.

Mules, Ulcerative Lymphangitis	14	Buffalo, Negative	...	4
Mules, Negative	32	Elephant	...	2
Pony, Ulcerative Lymphangitis	2	Bush-buck	...	10
Donkeys, Negative	4	Water-buck	...	3
Goats, Trypanosomes	104	Reed-buck	...	1
Goats, Negative	417	Kongoni	...	2
Sheep, Negative	51	Cobus, Micrococci	...	1
Monkey, Negative	1	Cobus, Negative	...	1
Cat, Negative	1	Oribi, Micrococci	...	1
Fowls, Negative	8	Oribi, Negative	...	1

Cases Treated at the Veterinary Dispensary.

Cattle	...	583	Dogs	...	192
Mules	...	14	Ponies	...	3
Parrots	...	3	Monkeys	...	5
Donkeys	...	2	Fowls	...	9
Sheep	...	7	Cats	...	2
Goats	...	17			

Deaths of Government Live Stock.

Deaths reported amongst Government Live Stock in various districts are shewn in the schedule attached.

Schedule showing Deaths reported amongst Government Live Stock during 1917-1918.

NAMES OF PLACES AND DISTRICTS.		Bullocks.	Calves.	Donkey.	Mule.	Trypanosomiasis.	Cirrhosis of Liver.	Pericoritis.	Anaplasmosis.	After effect of inoculation.	Tuberculosis and Trypanosomiasis.	Anthrax.	Anemia and debility.	Gastritis and Typhinitis.	Trypanosomiasis Anaplasmosis.	Accidents.	Old Age.	Gall-Sickness.	Cause of death not known.
BUTIABA	....	....	....	....	1	1	....	....	....	....	....	....	....	....	....	....	....	....	....
MATIRI	....	31	....	....	....	30	....	....	....	....	....	....	....	....	....	....	....	....	1
KAMPALA	....	46	...	1	...	32	1	2	2	...	1	1	3	1	2	1	1	....	....
ENTEBBE	....	1	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....
JINJA	....	3	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	2
MBALE	....	2	....	....	....	....	....	....	....	2	....	....	....	....	....	....	....	....	....
MBALE—KAMPALA	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1
CHUA	....	....	3	...	....	....	....	....	....	....	....	....	2	....	....	....	....	....	1
SOROTI	....	2	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	1	....
SOROTI—KAMPALA	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....
SOROTI—JINJA	....	3	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	2	....
TORO—MATIRI	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1
TOTAL	....	91	3	1	1	64	1	2	2	3	1	1	6	1	2	2	2	3	6

General.

During the past year rinderpest did not cause severe losses amongst cattle except in the Districts of Lango and Bukedi, but the introduction of this disease into the game in Bunyoro will lead to very heavy losses in the Western and Buganda Provinces.

These Provinces contain hundreds of thousands of cattle which are very highly susceptible to rinderpest and, unlike the Eastern Province where cattle are scarce, game is numerous. Throughout these areas rinderpest must be expected to spread rapidly and to work its way through the game into Ankole and thence to Ruanda and the Congo.

I record my best thanks to all the Staff of the Veterinary Division for their good work done during the past year.

E. HUTCHINS,
Chief Veterinary Officer.

ANNUAL REPORT

OF

THE GOVERNMENT ENTOMOLOGIST.

BIOLOGICAL LABORATORY,
KAMPALA, UGANDA.

During the year under review a few additional insects have made their appearance as pests. Brief notes of the insect pests of the year are given below under the headings of the crops which they attack.

Pests of Coffee.

1. Scale Insects (*Coccidæ*).

There is only one species, *Ceroplastes destructor*, to be added to the list published in my previous report. Against each species the names of the food plants, other than coffee (if any), are stated, as the knowledge of the food plants is of economic importance in that it has a bearing on such questions as the destruction of vegetation in the vicinity of the crops, as well as on the advisability or otherwise of using certain trees for wind-breaks or shade.

1. *Icerya nigroareolata*, Newst. On crotons.
2. *Asterolecanium coffeæ*, Newst.
3. *Pseudococcus citri*, Risso. On Citrus spp., cacao. The root form is accompanied by the ant, *Acropyga gowdeyi*, Wheeler.
4. *Pseudococcus virgatus*, Ckll. Trees infected for experimental purposes with this species were rapidly killed.
5. *Pulvinaria psidii*, Mask. On bark-cloth tree, guava, tea, an ornamental shrub (*alternanthera*), invule.
6. *Ceroplastes ceriferus*, And. On orange, bark-cloth tree, hibiscus, cannas, crotons, tea, antigonon.
7. *Ceroplastes destructor*, Newst. On guava, bark-cloth tree. A large series of specimens collected on the latter food plant was found to be highly parasitized by a Chalcidid wasp.
8. *Ceroplastes galeatus*, Newst. On bark-cloth tree. Parasitized by the Chalcidids, *Neomphaloidella ceroplastæ*, Gir., *Eurytoma galeati*, Gir., and *Scutellista cyanea*, Motsh.
9. *Ceroplastes vinsonioides*, Newst. On Baikea, orange, pigeon pea, guava. On a certain estate on which there is a row of orange trees bordering a coffee plot, the orange as well as the coffee trees were attacked; the former to a greater extent than the latter.
10. *Coccus africanus*, Newst.
11. *Coccus viridis*, Green. On guava.
12. *Saissetia hemisphaerica*, Targ. On ferns.
13. *Saissetia nigra*, Nietn. On *Anona* spp., *Ficus* spp.
14. *Saissetia subhemisphaerica*, Newst. On ferns.
15. *Stictococcus gowdeyi*, Newst. On the imported tree, *Harrogonia madagascariensis*. Parasitized by the Chalcidids, *Coccophagus comperei*, Gir., *Epitetrastichus ugandensis*, Gir.
16. *Selanaspis articulatus*, Morg. On bark-cloth tree.
17. *Ischnaspis longirostris*, Sign. On palms, bamboo.

2. Plant Lice (*Aphidæ*).

Only one case, that of *Toxoptera coffeæ*. Nietn., was reported during the year. This species also occurs on the shade tree, *Gliricidia maculata*.

3. Plant Bugs.

a. *Lycidocorus mimeticus*, R. & P.

This pest was reported on one estate in Masaka District, and on one in Busiro in Entebbe District.

b. *Piezodorus pallescens*, Germ.

This bug belongs to the same family as the Variegated Bug, and the injuries caused by these bugs are somewhat similar.

c. The Variegated Bug (*Antestia orbitalis*, Westw., var. *faceta*, Germ.)

The Variegated Bug, *Antestia orbitalis*, Westw., var. *faceta*, Germ. (*Cimex* [*Antestia*] *variegata*, Thunb.), was described as early as 1837 by Germar* and is recorded as feeding on *Coffea arabica* in the Transvaal, Natal, Cape Colony, Nyasaland, Bechuanaland, German East Africa and Zanzibar. In this country it attacks *C. robusta* and *C. arabica*, with an apparent preference for the latter, which is explained, probably, by the fact that the pericarp of the latter is the more succulent

Its allies, *A. orbitalis*, var. *lineaticollis*, Stal, and *A. cruciata*, Fab., are recorded as being pests of *C. arabica* in British East Africa and in the East, respectively. Of *A. cruciata*, Bainbrigge-Fletcher† gives its status as "An occasionally serious pest of coffee."

A. orbitalis, var. *faceta* only made its presence felt as a pest of coffee in Uganda in the early months of 1916. But in 1915 twigs of coffee, of which the terminals had been killed, were received from one estate in Kiagwe together with certain bugs, and I expressed the opinion that the insects submitted to me were not responsible for the damage and I requested the Manager of that estate to make further search, which was done, but no Variegated Bug was amongst the insects submitted to me. Since the recent examination of a very large number of twigs, I am certain now that the twigs submitted in 1915 were damaged by this bug. The insects are very elusive in their habits, which doubtless explains the fact that though their work has been known for sometime they themselves have only recently been connected with it

Reports of outbreaks have been received from the districts of Busiro, Kiagwe, Singo, Kiadondo, Bulemezi, Bwekula, Bunyoro, and Busoga.

The serious outbreaks of this bug cannot be regarded as being fortuitous, as is generally considered amongst the planting community; but as being cumulative, consequent on the disturbance of natural conditions due to the planting of large areas of coffee. From a few *robusta* coffee trees in the native villages the acreage has been increased to some 24,000 acres—practically all of which is *arabica*—with the result that this rapid increase of food, and of a different strain, has resulted in the upsetting of the balance, and the number of the bugs has proportionately increased.

HABITS:—The eggs are deposited on any part of the plant or on fallen leaves, prunings and fruit. The immature insects, or nymphs, on hatching remain in clusters around the egg-shells for several hours, after which they disperse in search of food. As already mentioned they are very elusive in habits. When disturbed they run with great rapidity, concealing themselves in the axils of the leaves or branches, inside the clusters of berries and curled leaves. The young nymphs do not readily fall to the ground and are not readily washed off by heavy rain, but, during the later instars, they exhibit an increasing tendency to drop when disturbed. I have observed that nymphs of the first and second instars run rapidly in an attempt to conceal themselves on being disturbed, but will rarely drop to the ground unless unavoidable, whereas the third instar nymphs exhibit a tendency to drop, while nymphs of the fourth and fifth instars drop more readily.

When neither flowers or fruit are available the newly hatched nymphs seem to prefer the foliage, though they will also puncture the tender shoots, such as suckers. But as soon as flowers or fruit are available the nymphs cluster on them, though they readily attack the new leaves as they appear. Although I have reared the bug to the adult stage exclusively on tender leaves, there is no doubt that the flowers and fruit are preferred, and they can only with difficulty be induced to feed on mature leaves. After a heavy rain while the insects are still in the earlier instars they appear to be less numerous about the trees, but an examination of the flower clusters and berries will result in the finding of a large number of the insects. When the set of fruit is light, due either to the presence of the bugs themselves or to other reasons, a few bugs suffice to complete the loss, and then no other food being available, they feed upon the leaves and tender shoots. When fruit or flowers are not available the nymphs roam over the tree, particularly when they are not numerous.

They are able to withstand somewhat prolonged periods of starvation. Nymphs have been kept alive on dead young plants in an insectarium for twenty days, though during most of that time it must have been impossible for them to extract any nourishment from the dead plants.

The adults are very active, taking to flight readily when disturbed. Like the nymphs they are very shy, and when one approaches a tree where the insects are observed clustering on the fruit, they usually make their way quickly around to the farther side,

*Silb. Rev. Ent. V, p. 172 (1637).

†Some South India Insects, p. 472 (1914).

and take to flight if molested further. On dull days or in rainy weather they are sluggish and drop on slight provocation, though they usually take to flight before striking the ground. They appear to be strong fliers, but under natural conditions it is unlikely that the adults venture far afield from the plot in which they have developed. In feeding, the adult bugs will only have recourse to foliage when no other food is available, evidently preferring a diet of fruit.

LIFE-HISTORY.—The eggs are oval, about one-sixteenth of an inch long, and are laid in irregular shaped clusters arranged in contiguous rows, from seven to thirty eggs being found in a cluster. Newly-laid eggs are dull pearly-white becoming slate coloured or darker a few days before hatching, due to the embryo being apparent through the translucent chorion so that the approximate development of the embryo may be determined by the colour.

In from eight to twelve days, a small, disc-shaped piece of the shell is forced open toward one end of the egg and a minute nymph appears. The newly emerged bug is black without any spots. The young bugs hatching from a cluster of eggs remain together in a sort of a family near the egg-cluster from which they emerged for at least twenty-four hours. As soon as feeding begins the abdomen gradually becomes distended, indicating the necessity for a larger expansion of the hard exo-skeleton than is possible to the first exo-skeleton, and this predicament is solved by the process of moulting, which takes place in from ten to fourteen days. The nymph assumes a quiet position, the exo-skeleton splits down the middle of the back along the thorax and the anterior abdomen, and gradually the little nymph pulls itself out. The time required for this moulting varies from one to four hours. A few hours later the new exo-skeleton has hardened and the nymph has entered on its second instar. The insect is about one-fifth of an inch larger, one orange-yellow spot has appeared on the median line of the prothorax, two similar spots on the first dorsal segment of the abdomen, the legs (femora and tibiae) marked with reddish yellow, the margin of thorax white. The nymph is now more active and continues to feed for from fourteen to sixteen days, before moulting again. In the third stage it is considerably larger, and more spots appear on the thorax and abdomen. In from thirteen to fourteen days the third moult takes place and then appear wing-pads extending back from the thorax. In about another fifteen to twenty days the exo-skeleton is moulted for the fourth time and the fifth instar is easily recognized as a full grown nymph, the wing-pads and thorax being much enlarged. After feeding for another fifteen to twenty days it moults for the last time and transforms to the winged adult.

The bugs usually live for a considerable time as adults. The complete cycle from egg-laying to the death of the adult takes an average of one hundred days. There is no demarcation in the broods. For instance at the end of March on one estate a very large majority of the bugs were in the adult stage, while at another estate, only 24 miles distant from the other estate, the nymphs were largely in the majority. A demarcation of broods would enormously simplify the application of remedial measures.

TABLE I.—Showing Duration of Metamorphic Stages from Egg to Adult.

Experiment Number.	Egg Deposited.	Nymphs Emerged.	Incubation Period.	First Moul.	Duration of First Instar.	Second Moul.	Duration of Second Instar.	Third Moul.	Duration of Third Instar.	Fourth Moul.	Duration of Fourth Instar.	Fifth Moul.	Length of Fifth Instar.	Adults Died.	Longevity of Adult.
			Days.		Days.		Days.		Days.		Days.		Days.		Days.
1	Mar. 14	Mar. 28	11	April 10	13	April 25	15	May 11	16	May 30	19	June 19	19	July 8	21
2	" 14	" 14	9	" 6	14	" 20	14	" 5	15	" 22	17	" 11	20	June 26	15
3	" 14	" 22	8	" 2	11	" 18	16	" 1	13	" 16	15	May 31	15	" 13	13
4	" 13	" 23	10	" 3	11	" 17	14	" 1	14	" 17	16	June 2	16	" 21	19
5	" 13	" 23	10	" 6	14	" 21	15	" 7	16	" 27	20	" 13	17	" 24	11
6	" 23	April 4	12	" 16	12	" 30	14	" 16	16	" 31	15	" 15	15	" 29	14
7	" 24	" 1	8	" 12	11	" 27	15	" 13	16	June 2	20	" 18	16	July 3	15
8	" 24	" 1	8	" 6	13	" 22	16	" 7	15	May 23	16	" 8	16	June 27	19
9	" 25	" 4	10	" 18	14	May 2	14	" 17	15	June 4	18	" 24	20	July 10	16
10	" 26	" 3	8	" 17	14	" 1	14	" 17	16	" 2	20	" 17	15	" 3	16
11	" 26	" 4	9	" 17	13	" 1	14	" 17	16	" 3	17	" 21	18	" 11	20
12	" 26	" 6	11	" 26	10	" 11	15	" 24	13	" 8	15	" 25	17	" 11	16
13	" 27	" 6	10	" 26	10	" 11	15	" 27	16	" 11	15	" 26	15	" 14	18
14	" 24	" 4	8	" 17	13	" 2	15	" 16	14	" 3	18	" 21	18	" 7	16
15	" 28	" 7	10	" 21	14	" 3	15	" 19	16	" 6	18	" 26	20	" 12	16
16	" 28	" 7	10	" 27	10	" 13	16	" 28	15	" 14	17	July 1	17	" 20	19
17	" 29	" 6	8	" 18	12	" 2	14	" 17	15	" 2	16	June 21	19	" 11	20
18	" 29	" 7	9	" 21	14	" 7	16	" 23	16	" 10	18	" 28	18	" 14	20

Table II.—Showing Average Duration of Metamorphic Stages and Life-Cycle.

Number of Experiments.	AVERAGE NUMBER OF DAYS OF							
	Incubation Period.	First Instar.	Second Instar.	Third Instar.	Fourth Instar.	Fifth Instar.	Longevity of Adult.	Life-Cycle of Insect.
18	9	12	14	15	17	17	16	100

NATURE OF INJURIES:—The Variegated Bug causes injury to the coffee plant in several ways. It kills the tender leaves of the tips of the terminals, which causes the trees to produce numerous secondaries, and so increases the amount of pruning required.

By sucking the berries—the newly set as well as the well developed berries—it causes them to drop. The berries are often sucked to such an extent that all the juice is extracted from the pulp around the beans. Moreover, the puncturing of the berry permits of the ingress of fungoid spores, the development of which completes the destruction of the berry if not completed directly by the bug itself.

There is no doubt that the Variegated Bug is responsible for the non-setting of flowers. It is by no means a lucky incident to detect the bugs actually in the act of puncturing the flower-buds, besides which the examination of the flower-buds often reveals punctures.

That all dead flowers, or the non-setting of flowers, is attributable to the Variegated Bug, however, is a fallacy, and I have been misquoted to this effect. I repeat that the attack of the Variegated Bug is merely one of the causes of the non-setting of flowers, and as it is a matter about which the planters are greatly concerned, I shall digress to state briefly some of the other important causes of the non-setting of the flowers. First, from physiological reasons, mainly that of the lack of virility of the plants, all of the flowers produced do not set, that is, there is over-production resulting in a survival of the fittest. Secondly, the trees may be attacked by fungi and be weakened to such an extent that they are unable to produce a crop. Thirdly, drought or a cessation of rains at a critical time, may, as happened last year in one district at least, follow on after a few weeks' rains which brought out the flowers, and which may then die off during the break in the rains. Fourthly, non-pruning—in unpruned plants the tendency of the plant is to produce foliage at the expense of fruit, and this is particularly true of coffee. These four causes by no means exhaust the probable causes that can be advanced to explain the non-setting of flowers, but they show that the Variegated Bug cannot be held wholly responsible.

In addition to coffee I have records of the Variegated Bug feeding on the flowers of *Gliciridia maculata* (according to Maitland), which is used as a shade tree for cacao, and the fruit of custard apple and sugar apple.

Usually the cultural measure which is the most important is clean cultivation. This comprises the removal of weeds from the fields, the removal of prunings and the stimulation of plant growth.

A belt of open ground around coffee plots forms an excellent defence against an invasion of pests. It may be frequently observed that the bugs are more numerous on the outside rows of fields which are bordered by uncultivated land than in the centre of the plot.

Any agricultural practice, such as manuring, that results in the stimulation of the growth of the plants should be practised, for it not only tends to minimize the effect of insect attacks, but a robust plant often escapes attack, or may at least suffer comparatively little, while a weakly plant is not able to throw off the attack. This is expressly important when the insect concerned is a sucking insect.

The trees must be properly pruned, and also they should not be planted too closely, so that all parts are readily accessible to the spray. The prunings should be swept up and burnt, so that any eggs or young nymphs which may happen to be on the prunings will be destroyed.

INSECTICIDES.—Since contact insecticides only kill by contact, it is essential to bear in mind that for such insecticides to be effective the insecticide must be brought into touch with the insect; that the object of the operation is not to spray the tree itself with the idea that the presence of the spray on the tree will act as a repellent to the insect.

With regard to the question as to the time of spraying, there are two points to be considered. So far as I have been able to ascertain there is no clearly demarcated period of aestivation, that is, a period of dormancy, and no clear demarcation between the broods, that is to say, eggs, nymphs of different instars and adults are found at the same time on the same estate. This complicates the problem of control, for the body of the adult being more protected by the wing-covers than that of the nymph the adult is more resistant to sprays. Whereas, were the broods well demarcated, the time for spraying could be restricted to the nymphal period. The other point to be regarded under this heading is that since the bugs are more agile during the heat of the day, spraying operations should be limited to the earlier or later part of the day.

The control of the insect by spraying is made difficult by its elusive habits, by its ability to hide in inaccessible places, and by the fact that many of the bugs fall off the trees, only to make their way back again after the spraying is finished.

Experiments with several spraying mixtures were carried out in the insectary and the most promising were given a trial in the field, and these again were given a trial by Mr. Maitland to corroborate, or otherwise, my results.

Experiments were conducted with the following sprays:—

I. WHALE OIL SOAP.—

W hale Oil Soap.	...	...	...	1 lb.
Water	...	...	...	4 gals.

At this strength this spray is not sufficiently strong to be effective, and at a greater strength the tips of the leaves become brown:

II. RESIN WASH.—

Caustic Soda, 92%	...	...	...	4 lbs.
Resin	...	...	...	6 lbs.
W hale Oil Soap	...	...	...	10 lbs.

Powder the resin and soda, boil together in two gallons of water until they are dissolved. Make up slowly to five gallons with water while still boiling the mixture. In another vessel dissolve the whale oil soap in five gallons of hot water. Mix the two lots of solution and dilute to 45 gallons.

This spraying mixture proved to be the most effective of all the mixtures experimented with, and in view of its effectiveness and its cost I regard it as being the best spray to be used.

III. KEROSENE EMULSION.—

Soap, soft	...	...	...	1 qt.
Kerosene	...	...	...	1 pt.

Dissolve the soap in two qts. of hot water, add the Kerosene and emulsify. This stock solution is made ready for use by adding an equal amount of water.

This insecticide did not prove sufficiently effective to justify its adoption.

IV. CARBOLIC ACID EMULSION.—

Soap, hard	...	...	...	1 lb.
Carbolic Acid (crude)	...	...	...	1 pt.
Water	...	...	...	1 gal.

Dissolve the soap in hot water, add the carbolic acid and churn vigorously until an emulsion is formed. Dilute with 20 parts of water.

This mixture proved to be next in effectiveness to the Resin Wash.

V. LINSEED OIL EMULSION.—

Soap, hard	...	...	...	1 lb.
Linseed Oil	...	...	...	1 gal.
Water	...	...	...	2 gals.

Shave the soap fine and dissolve in hot water. Add the oil while the soap solution is still hot. Churn the mixture until no oil separates when the emulsion cools. This stock solution should be diluted with water to a strength of one part to eight.

The results of the experiments with this mixture showed that it ranked in effectiveness next to the Resin Wash and the Carbolic Acid Emulsion.

VI. "BLACK LEAF 40"

"Black Leaf 40"	...	...	...	$\frac{3}{4}$ lb.
Water	...	...	...	100 gals.

This insecticide—a proprietary one—is effective, but its cost is prohibitive on a large scale.

At this point it may be of interest for me to give figures relative to spraying obtained from the Manager of an estate, on which a large amount of spraying has been done. The cost of spraying, exclusive of the cost of materials, 220 acres by 27 men

was Rs. 66/-. The gang was divided as follows—12 men and a headman to carry water, 2 men to each sprayer, of which there were 5 in use, and 5 helpers. The maximum number of acres sprayed per day was 17, and the minimum $12\frac{1}{2}$ acres. Thoughtful organization and careful supervision resulted in the increase of the acreage sprayed from $12\frac{1}{2}$ to 17 acres per day.

COLLECTING.—The crusade against this bug by collecting should be carried out systematically. Obviously every bug and egg mass collected and destroyed materially reduces the numbers of the following brood, and it is equally obvious that it is more important to prevent an insect from increasing than it is to reduce the number when the species has become disastrously abundant. Collection of the eggs and the bugs should be started on every estate as soon as the presence of the bug has been discovered and continued as long as there are any eggs or bugs to be found, and furthermore, it is worth while to have someone constantly on the lookout even after the collecting gang has failed to find any eggs or bugs, so as to be on the lookout for the inception of another outbreak, which is often easily stopped in its inception; in other words, negative results in such a case are worth paying for. It is widely believed that large infestations occur in the nature of a spontaneous or fortuitous outbreak; this is an error of fact: they are cumulative.

It is the practice on all estates where collecting is carried out to have the collectors collect the insects with their fingers and put their collections in banana fibre, or at the best, in tins with or without water. In preference to this I recommend the use of a collecting funnel. The bugs are jarred from the trees into the funnel, from which at the end of the day's work the bugs can be emptied by opening the sleeve at the bottom and destroying the bugs. The adoption of such a funnel increases the rapidity with which the bugs can be collected, especially if the collection be carried on during the hotter part of the day when the bugs are most agile and hence less easily captured in one's fingers. Funnels without sleeves are procurable from the Mengo Planters, Ltd.

NATURAL ENEMIES.—The principal natural check as yet discovered on this bug is a wasp belonging to the family *Chalcididae*, which is parasitic on the eggs of the bug.

That parasites and predaceous insects play a considerable part in the economy of a large number of insects is an established fact. To cite an example of a local insect, being largely controlled by other insects: the scale insect, *Coccus viridis*, which according to Green, together with *Hemileia*, resulted in the abandoning of thousands of acres of coffee in Ceylon, is in this country so well kept in check by a *Chalcidid* wasp and the predaceous beetles, *Chilocorus discoides* and *C. punctata*, that artificial control measures are seldom necessary. The eggs of the bug are parasitized by the wasp. The female wasp oviposits in the eggs of the host and the parasite on hatching feeds on the embryonic bug, resulting in the destruction of the latter. The parasite passes through all its metamorphoses within the egg of the host, from which it emerges as a full grown wasp.

Being convinced that this wasp will prove to be a great factor in the control of the bug, I urge that the eggs of the bugs be collected, the parasites to be systematically reared and liberated in coffee plots in as large colonies as possible, and that the bugs that emerge from the unparasitized eggs be destroyed. The box should be about 6 inches long, 4 inches wide and about the same depth, fitted with an outer cover of wood and, in addition with an inner cover of glass to permit of the examination of the material without allowing the escape of the small insects; in one side of the box a hole is bored and a glass tube fitted into it; the tube can be quickly removed, the hole stopped with cotton, or another tube inserted, and the wasps liberated.

Whenever I have discussed the value of the egg parasitism of the bug by the wasp, I have met with the expression of opinion that no good will result from the collection of the eggs of the bug and the liberation of the wasps, for since, although the percentage of parasitism was at first high, the percentage subsequently dropped. The decrease of the percentage of parasitism is a natural phenomenon; it is merely the periodic fluctuation or pendulistic variation of the proportion of the bugs to parasites, which is explained as follows:—When a parasite attacks a pest (or host) it reduces the number of the host and in consequence of the abundance of the food the numbers of the parasite increase. Then as soon as the number of parasites increases so that it has become disproportionately large to that of the host the parasite is forced to oviposit—in the case of the Variegated Bug—in eggs already parasitized. Superparasitism now occurs, with the result that few parasites are available in the next generation to oviposit in the eggs of the bugs which emerged from the eggs that escaped being parasitized in the previous generation. The numbers both of the bug and the parasite suddenly

decrease; that of the bug because of the large proportion destroyed by the large number of parasites present; and that of the parasite on account of the internecine struggles due to superparasitism. In such a case the mortality amongst the parasites is proportionately higher than that of the bug and the mortality may be further increased by hyperparasites, that is, parasites parasitic upon another parasite. Then the bug is now able to increase its numbers rapidly, the parasites again increase, since the increased number of bugs provides more food until the increase of the parasites once more overtakes that of the bug, with the result that superparasitism again takes place and the wave of the increase of the parasite is once more checked.

4. Leaf Eating Caterpillars.

a. *Parasa* sp.

No damage by this caterpillar was reported.

b. *Metadrepna glauca*, Hmp.

This insect was much less prevalent, due probably to the unusually prolonged drought which lasted from October to March.

5. Thrips.

Two species of Thrips made their presence felt as pests during the year—*Diarthrothrips coffeae*, Will., and an unidentified species.

a. *Diarthrothrips coffeae*, Will.*

"FEMALE.—Colour pale yellowish-brown, the sides of the head posteriorly and the abdomen, except for the last three segments, a little darker. Wings pale yellowish with two small dark areas. Pigment around the ocelli (simple eyes) red. Antennae rather darker than the body; legs lighter. Length, 1.16 mm."

"MALE.—Paler than the female and about one-fifth smaller."

The presence of this insect has not previously been reported. It caused considerable loss on several estates in Busoga and Masindi Districts—that is, in the drier parts of the Protectorate—and ranks as a major pest on this crop.

The control measures recommended against this pest are spraying with kerosene emulsion and the destruction of the fallen leaves.

b. *Thrips*—Species unidentified.

Specimens of this species were submitted from Buddu and Mubendi Districts. At present it may be regarded as a minor pest, but, on account of its habit of curling the margins of the leaves and concealing itself therein so that it is difficult to get a spray into contact with it, it may prove difficult to control.

6. Mediterranean Fruit Fly.

Ceratitis capitata, Wied.

This insect appears to be ubiquitous, but on estates on which the berries are not allowed to remain on the trees in an over-ripe condition, it causes but little damage and the number is decreasing.

7. Borers.

a. Berry Borer—*Stephanoderes coffeae*, Haged.

As in the preceding year the loss caused by this beetle was not as great as a few years ago and it is indisputable that on estates on which the parchment coffee is dried artificially this pest is on the wane. The reason for this is, in my opinion, that when the coffee is sundried the temperature is not sufficiently high to kill the insects within the berries and hence the increase in the numbers of the succeeding generations continues without any check.

b. Stem Borers.

The stem borers reported were *Apate monacha*, F. *A. indistincta*, Hurr., and *Nitocris princeps*, Jord. The Braconid parasite (No. 3939) on the last named species was reported to have been more in evidence than hitherto.

8. The Leaf Minor.

Leucoptera (Cemiostoma) coffeella, Staint.

This insect continues to be very prevalent on a few estates in Singo District, and was also reported on one estate in Buddu District.

9. Crickets.

Gryllus bimaculatus, de G.

Gryllotalpa africana, P. de B.

In outbreaks of these insects the following bait proved efficacious—

Paris Green	...	...	...	...	1 lb.
Flour	...	...	...	...	14 lbs.
Jaggery	...	...	...	...	3 lbs.
Lemons, juice of	...	...	...	...	6
Water	...	...	...	...	3 gals.

* Williams, Bul. Ent. Res., VI, p. 269 (1915).

10. Millipedes.

Millipedes attacked newly planted out coffee on a few estates. Baits were experimented with against them with but little success, and in the end collecting was resorted to.

Pests of Cacao.

1. Scale Insects.

There were no additions to the list of scale insects—*Stictococcus diversiseta*, Silv., *Pseudococcus citri*, Risso, and *Inglisia castilloæ*, var. *theobromæ*, Newst.—which attack this crop. *Stictococcus* is always accompanied by the ant, *Cecophylla smaragdina*, F., race *longinoda*, Latr.

2. Plant Lice.

Toxoptera theobromæ, Schout.

Specimens of this species were submitted attacking the flower-clusters and the under surface of the young leaves.

3. Fruit Fly.

Ceratitis punctata, Wied.

On one estate a large number of over-ripe pods was found to be infested with the larvæ of this fly.

4. Twig Girdler.

Sthenias cylindrator, Fab.

No report of damage caused by this beetle was received during the year.

5. Shot Hole Borer.

Xyleborus camerinus, Haged.

Several branches attacked by the fungus *Diplodia* ("Dieback") were also attacked by this beetle. The presence of the beetle is not primarily the cause of the death of the tree, but the consequence of the weak state of the tree due to the presence of the above fungus.

6. Leaf Feeders.

a. *Adoretus hirtellus*, Castn.

The beetle was without doubt one cause of the retarded growth of this crop on certain of the estates in Busoga District.

b. *Parasa vivida*, Walk.

The caterpillars when fully grown are pale bluish-green in colour; the dorsum and sides have processes which bear stiff hairs that are exceedingly irritating; on the middle of the back there is an almost circular spot of pale-blue and reddish; length, 30—35 mm.

The cocoons are of hard texture, ovoid, open at one end by a large lid.

MOTH: Head brown, except the front, which is greenish, antennae ochraceous; thorax pale-green, underneath of the thorax and all of the abdomen of the same colour as the antennae; wings pale-green, with a straight band of brown on the sides; hind wings pale-yellow at the base shading to brown towards the distal portion; undersides of the wings yellowish, shading to brown towards the margins. Expanse wings, 27—30 mm; length of body 12—14 mm.

The caterpillars of this species feed on the under surface of leaves in colonies and hence are easily destroyed, but on account of their coloration they are somewhat difficult to detect. During the first instar they eat only the outer layer of the parenchyma, resulting in the formation of dried spots on the leaves; during the second instar they devour all the parenchyma leaving the veins untouched; after the second instar they devour all the leaf surface except the mid-rib. On attaining maturity the caterpillars form their cocoons on the trunks of the trees.

c. *Diacrisia maculosa*, Cram.

The caterpillars of this moth attack the foliage of cacao. The cocoons are brownish in colour.

MOTH: Head yellowish-white, antennae and eyes darker; thorax concolorous with head, with four black spots on the upper surface; abdomen above yellow, underneath dirty white, sides with black spots; wings whitish, spotted with black. Expanse of wings, 34—36 mm.; length of body, 6—7 mm.

7. Pod Moth.

Euproctis mediosquamosa, B.—Baker.

The caterpillars are hairy, dark in colour, the head and feet yellowish; length 18 mm.

The cocoons are composed of brownish-white silk, ovoid in shape, about 15—18 mm. in length.

MOTH: General colour yellowish-white; front wings more yellow than the hind wings, and the former are crossed by a line of black spots; tip of abdomen of female covered with golden brown hair. Expanse of wings, 20—26 mm.; Length of body, 8—10 mm.

The caterpillars eat the parenchyma of well developed pods, resulting in irregular trails, which quickly heal forming corky scars.

8. Thrips.

Species unidentified.

One case of Thrips was reported during the year.

9. Bug.

Libyaspis (Plataspis) vermicellaris, Stal.

A few specimens of this bug were submitted attacking cacao twigs as well as *Erythrina* which was grown amongst the cacao as a shade tree.

10. 'Mosquito Blight.'

Helopeltis bergrothii, Reut., var.

The eggs are about 1.5 mm. long, with a long, white projection at one end. They are laid in the succulent twigs and pods.

ADULT: General colour reddish-yellow; antennae long, slender; legs long, slender scutellum (shield) with a long erect spine.

Table III.—Showing Duration of Metamorphic stages.

Eggs Deposited.	Nymphs Emerged.	Incubation Period.	First Moults	Second Moults.	Third Moults.	Fourth Moults.	Fifth Moults.	Length of Nymphal Period
Nov. 4	Nov. 10	6 days	Nov. 12	Nov. 14	Nov. 16	Nov. 18	Nov. 21	11 days.
Feb. 3	Feb. 9	6 „	Feb. 11	Feb. 13	Feb. 15	Feb. 17	Feb. 20	11 „

Pests of Para Rubber.

1. Bourbon Scale Insect.

Aspidiotus destructor, Sign.

A few cases of this insect were reported. The other food plants of this Coccid are banana, screw pine, guava and mango.

2. Shot Hole Borers.

Three species of these borers are now known to attack Para which are diseased or in a weakened state due to some other cause. They are *Xyleborus affinis*, Eich., *X. confusus*, Eich., and *X. perforans*, Woll.

Pests of Tea.

The only insects as yet known to attack this crop are the scale insects, *Aspidiotus transparens*, Green, and *Coccus discrepans*, Green, the 'Mosquito Blight,' *Helopeltis bergrothii*, Reut., var., and the mole cricket, *Gryllotalpa africana*, P. de B.

The last mentioned species feeds on the roots of the young tea plants whilst in the nursery.

Pests of Cotton.

The usual cotton pests appear to have been prevalent—namely, stainers—*Dysdercus* spp. and *Oxycaerus* spp., bollworm, and the Leaf-footed Plant Bug, *Leptoglossus membranaceus*, F.

Pests of Grain.

1. Wheat.

Specimens of the Cetoniid beetle, *Gnathocera trivittata* Swed., and the green fly, *Macrosiphum granarium*, Kirby, were received from the Eastern Province attacking the flowers of this crop.

2. Maize.

The green fly *Aphis maidis*, Fitch, was found feeding on the flowers of maize.

Pests on Shade Trees.

The following insects are known to attack the trees used for shading cacao :—

Gliricidia maculata—

1. Scale insects—*a. Pseudococcus citri*, Risso.
b. Coccus longulus, Dougl.
2. Green Fly—*Toxoptera coffea*, Nietn.

Erythrina—

1. Scale insects—*Aulacaspis chionaspis*, Green.
2. The Bug—*Libyaspis (Plataspis) vermicellaris*, Stal.
3. An unidentified Lepidopterous larva—a stem borer.

Visits to Estates.

Visits were made to twenty-four European Estates, mainly in connection with investigations of outbreaks of the Variegated Bug and Thrips.

Locusts.

There were more swarms of Locusts reported than in the preceding year, and the swarms appear to have been much larger. The following swarms were reported :—On Bukona Estate, near Iganga; on Kivuvu and Kireka Estates; throughout the Lango District; in Kigulu and Bugabula counties, Busoga; in Mawogola and Kabula counties, Masaka District; an enormous swarm passed over Kampala which came from Kiagwe and proceeded in a westerly direction; in the Mabira Forest.

The Collection.

A large number of insects was added to the collection during the year, as well as a large series of microscopic preparations of scale insects, Aphids and Thrips.

The following insects were donated to the Imperial Bureau of Entomology :—

Diptera	...	56	Coccidæ, spp	...	1
Thysanoptera, spp	...	2	Rhynchota, Other	...	171
Hymenoptera	...	454	Orthoptera	...	20
Lepidoptera	...	19	Chrysopinæ	...	5
Isipteron	...	1			
Coleoptera	...	273			1,907
Aphidæ, spp	...	5			

As in previous years I am greatly indebted to Dr. Guy A. K. Marshall, Director of the Imperial Bureau of Entomology, for the identification of a considerable number of species of ticks and of all families of insects. I am also indebted to Dr. L. O. Howard, Chief of the United States Bureau of Entomology, for the identification of parasitic Hymenoptera, and to Dr. W. M. Wheeler, of the Bussey Institute, Harvard University, for the identification of ants.

Publications.

The following were published during the year :—"Some of the Most Important Agricultural Pests of Uganda;" Circulars, "Instructions for Forwarding Entomological Specimens;" "A List of Uganda Ticks and their Wild Hosts;" "A List of Uganda Coccidæ, their Food Plants and Natural Enemies."

Plant Imports.

One hundred and fourteen consignments of seeds and plants were examined during the year from the following countries :—

British East Africa	...	34	Java	...	...	2
German East Africa	...	5	West Indies	...	...	4
Nigeria	...	1	United Kingdom	...	...	40
South Africa	...	7	France	...	...	2
Australia	...	1				
India	...	17				114
Ceylon	...	1				

The Kampala Museum.

No addition was made to the Native Exhibits. A section comprising Economic products has been started but neither the type of cases nor floor space permits of satisfactory arrangement.

C. C. GOWDEY,
Government Entomologist.

ANNUAL REPORT

OF

THE GOVERNMENT BOTANIST.

The Government Botanist left on military duty on the 17th April and has thus been absent the whole year.

Three subjects were under investigation (a) Root disease of guava, suspected to be the same as that occurring on cacao, coffee, tea and rubber; (b) Hardening of cacao pods; (c) Sterile flowers on cacao. All had to be hurriedly abandoned.

The following paragraphs give a short account of the most prevalent plant diseases during the year.

Coffee.

Hemileia vastatrix, B. et Br. has been very little in evidence. "Die-back" has also been less common than formerly, but *Hymenochaete noxia*, Berk., is fairly general but is easily controlled.

Cacao.

Considerable losses from "Die-back" *Lasiodiplodia theobromæ*, G. et M., have taken place during the year and canker *Phytophthora Faberi*, De Bary, of a virulent type has caused the loss of a large number of trees. To the above must be added the hardening of pods, pod rot, and the sterility of flowers which are extremely common. Cacao cultivation has thus received a serious set-back.

Hevea.

"Bark-rot" or black thread disease made its appearance on several estates during the wet season and in two cases was most persistent. Tapping is stopped and the diseased parts treated with carbolineum or brunolineum. The appearance of warm dry weather however had a wonderful effect in retarding the spread of this disease.

On the Government Plantation, Kakumiro, three large trees which had previously been tapped were destroyed. At a distance the trees looked healthy, but under the bark large nodules of rubber were formed whilst in many places the latex had exuded and overflowed down the stem in long thin dirty coloured streams. A form of canker is suspected but, unfortunately, the excellent specimens which were forwarded to Kew for identification, were lost in transit.

Flat Burrs. An excellent specimen of a large flat burr, which was called "renewed bark" came under observation during the year. Owing to lack of skill in tapping in Uganda these may become common, so the following observations by the Assistant Director, Kew, are of interest.

"Flat Burrs" are usually formed from a number of small cores fused together. Their occurrence is probably increased by tapping. The small cores are about the size of a pea and they lie wholly in the cortex, and have no connection with the wood or cambium of the main stem. Each lump has a core of wood and possesses a cambium of its own. The cores increase in size by the addition of new wood and new bark to the outer tissues.

"If several lie near together, their cambiums come in contact and the woody cores are fused together and thus a large thin plate of some flattish irregular shape is formed. After a time the inner surface of the woody core produces a conical point and ultimately fuses with the wood of the main stem.

"At an early stage it is easy to remove these burrs by skinning off the outside and shelling out the core. If they are allowed to grow until they have fused with the main stem it is impossible to remove them without making an ugly wound."

Hevea still keeps up its reputation in Uganda for being comparatively free from pests of all kinds, and as it is now being largely planted, all interested should use every endeavour to keep down disease.

S. SIMPSON,
Director of Agriculture.

APPENDICES.

Appendix 1.

Estimated Number of Live-Stock in the Protectorate.

Province and District				Cattle	Sheep	Goats	Horses	Mules	Donkeys
BUGANDA :—									
	Mengo	...	...	70,000	8,500	150,000	...	*	6
	Entebbe	...	...	6,200	3,588	23,875	1	2	10
	Masaka	...	...	61,827	2,980	12,250	...	1	4
	Mubendi	...	...	8,000	4,100	24,100	...	1	1
	TOTAL	...	...	146,027	19,168	210,225	1	4	21
EASTERN :—									
	Busoga	...	...	39,500	18,000	45,000	1	2	1
	Bukedi	...	...	*	*	*	1	5	25
	Teso	...	...	156,000	41,000	90,000	...	1	40
	Lango	...	...	20,000	64,000	141,000	...	4	21
	Karamoja	}	...	No basis for an estimate.					
	Lobor		...						
	TOTAL	...	...	215,500	123,000	276,000	2	12	87
NORTHERN :—									
	Masindi	...	...	1,962	1,801	9,883	...	2	3
	Hoima	...	...	4,700	2,300	9,300	...	...	5
	Gulu	...	...	*	*	*	...	1	17
	Kitgum	...	...	9,000	7,000	30,000	...	6	100
	West Nile	...	...	30,000	30,000	60,000	...	4	3
	TOTAL	...	...	45,662	41,101	109,183	...	13	128
WESTERN :—									
	Toro	...	...	42,528	11,482	30,812	...	3	11
	Mbarara	...	...	215,000	50,000	250,000	...	...	5
	Kigezi	...	...	*	*	*	...	...	1
	TOTAL	...	...	257,528	61,482	280,812	...	3	17
RUDOLF :—									
	Turkwell	}	...	No basis for an estimate, but the number known to be very great.					
	Turkana		...						
	Dabossa		...						
	GRAND TOTAL	...	...	664,717	244,751	876,220	3	32	253

* Number unknown.

Native Agriculture.

Appendix 2.

Province and District.	Potatoes.		Millets.		Rubbers.		Cotton.	Coffee.	Beans.	Plantains	Maize.	Dhal.	Sinn-Sinn.	Sugar Cane.	Ground- nuts.	Cassava.	Tobacco.	Wheat.	Rice.	Chillies.	Cacao.	Vegetables	Pine Apples.		
	Sweet.		English.		Matama.	Wimbi.																		Para.	Other.
	ACRES.																								
BUGANDA.— Mengo Entebbe Masaka Mubendi	150,000	40	500	50	500	500	20,000	3,000	1,000	380,000	600	35	4,000	200	2,000	100	50	..	50	50	15	*	..		
	16,461	80	586	18	260	103	8,675	3,207	15,718	92,434	5,840	150	1,044	420	3,250	1,692	36	..	13	356	4	*	53		
	5,776	43	746	746	54	..	5,331	3,149	234	46,864	2,548	1,001	1,475	*	113	23	..	..	..	8	*	1,984			
	13,500	20	500	7,000	..	50	3,906	300	6,000	11,500	450	200	1,400	50	150	45	2,000	5	10	20	..	*	..		
TOTAL	185,737	183	2,332	7,814	814	653	37,906	9,656	22,952	530,798	9,438	1,386	7,919	670	5,513	1,860	2,086	5	73	434	19	..	2,037		
EASTERN.— Busoga Bukedi Teso Lango Karamoja Lobor	*	*	*	*	..	..	26,617	25	75	*	*	*	*	*	*	*	*	..	47	*	..	*	..		
	*	*	*	*	..	10	9,335	130	*	*	*	*	*	*	*	..	..	*	530	*	..	*	..		
	30,000	*	25,000	50,000	..	40	47,000	50	28,000	8,000	3,000	..	3,000	..	10,000	3,000	..	..	180	..	..	*	..		
	*	*	*	*	..	..	11,000	*	*	..	..	..	..	..	*	..	..	..	*	..	..	*	..		
TOTAL	30,000	..	25,000	50,000	..	50	93,952	205	28,075	8,000	3,000	..	3,000	..	10,000	3,000	..	..	757	..	..	*	..		
NORTHERN.— Masindi Hoima Gulu Kitgum West Nile	15,000	5	100	6,000	50	..	600	1,989	1,900	4,000	1,000	1,000	2,000	..	100	..	10	3	20	50	417	*	..		
	4,000	5	5,000	*	..	..	350	300	1,200	1,750	450	850	500	10	30	65	15	..	..	10	..	15	..		
	*	*	*	*	..	2	..	*	*	*	*	*	*	..	*	..	..	2	30	*	..	*	..		
	*	*	*	*	..	..	20	..	*	*	*	..	11,000	..	800	50	20	..	..	20	..	*	..		
TOTAL	20,300	10	37,100	49,000	50	2	970	2,294	7,300	5,754	1,550	1,850	13,500	10	930	115	45	5	70	60	417	15	..		
WESTERN.— Toro Mbarara Kigezi	10,000	3	1,000	30,000	..	..	2	70	20,000	12,000	1,000	2,000	1,000	400	800	500	5	800	10	..	..	*	..		
	20,000	20	4,000	15,000	..	..	700	350	10,500	15,000	1,000	10,000	150	15	500	200	350	15	..	5	..	*	..		
	7,000	40	30,000	20,000	..	..	..	3	40,000	2,700	4,000	85,000	..	..	..	2	200	40	..	..	..	*	..		
	42,000	63	35,000	65,000	..	5	702	423	70,500	29,700	6,000	97,000	1,150	415	1,300	702	555	855	10	5	..	..	..		
RUDOLF.— Turkvel Turkana Dabossa	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
GRAND TOTAL	278,037	256	99,432	171,814	864	710	133,530	12,578	128,827	574,252	19,988	100,236	25,569	1,095	17,743	5,677	2,686	865	910	499	436	15	2,037		

* Not known.

Compiled from Returns of 131 Plantations.

Province and District.	Number of Estates.	Total Acreage taken up.	Total Acreage under Cultivation.	Total Acreage not Cultivated.	Acreage of Coffee (Arabica).				Acreage of Coffee (Robusta).				Acreage of Coffee and Para.				Acreage of Para Rubber.				Acreage of other Rubbers.				Acreage of Cacao.		ACRES.										Cotton.	Maize.	Wheat.	Rice.	Beans.	Onions.	Ground Nuts.	Potatoes.	Ginger.	Tobacco.	Sugar Cane.	Various Crops.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
					Under 2 years.		Over 2 years.		Under 5 years.		Over 5 years.		Under 5 years.		Over 5 years.		Under 5 years.		Over 5 years.		Under 5 years.	Over 5 years.	Under 5 years.	Over 5 years.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
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Mengo	57	30,459	10,386	18,836	312	3,726	...	86	395	2,566	111	583	...	725	1,389	812	12	28	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...</

* Of these 639 acres are under shade.

† Of these 87 acres are under shade.

+ The whole of this area is under shade.

Mission Agriculture.

PROVINCE.		Coffee Arabica.	Coffee Robusta.	Para Rubber.	Other Rubbers.	Cacao.	Cotton.
		Acres.					
BUGANDA	...	557	26	247	115	125	154
EASTERN	...	61	...	...	5	4	...
NORTHERN	...	91	...	...	1	50	166
WESTERN	...	26	...	...	4	...	...
TOTALS	...	735	26	247	125	179	320

Appendix 4.

IMPERIAL INSTITUTE OF THE UNITED KINGDOM, THE COLONIES AND INDIA.

Results of the Examination of six Samples of Cotton grown on the Government Plantation, Kadunguru, Bugondo.

Variety.	Description.	Strength.	Length.	Commercial valuation with September Futures "middling," American at 18-77d. per lb.	REMARKS.
No. 1. Sunflower (Plot No. 18).	Soft, fairly lustrous, cream-coloured, free from stains. A little broken seed was present.	Good.	From 1·0 to 1·5 inch; mostly from 1·3 to 1·4 inch.	25d. (nominal)	Samples Nos. 1 to 5 are very similar in appearance and character. They differ slightly however in length of staple, and the variations in value appear to be based mainly on these differences.
No. 2. Sunflower. (Plot No. 5).	Similar to No. 1.	Good, but a little irregular.	From 1·0 to 1·5 inch; mostly from 1·2 to 1·4 inch.	25d. (nominal)	
No. 3. Sunflower (Plot No. 20).	Similar to No. 1.	Fair.	From 0·9 to 1·4 inch; mostly about 1·2 inch.	23·50d. (nominal)	
No. 4. Nyasaland. (General Crop unimproved).	Similar to No. 1.	Fair.	From 1·0 to 1·4 inch; mostly from 1·2 to 1·3 inch.	24d. (nominal)	
No. 5. Sunflower. (Plot No. 14).	Similar to No. 1.	Fairly good.	From 0·9 to 1·5 inch; mostly from 1·1 to 1·3 inch.	25d. (nominal)	The brokers regarded all the present samples as practically good and stated that No. 6 was the best Uganda cotton that they had seen.
No. 6. Sunflower. (Plot No. 7).	This sample was of better appearance than samples Nos. 1 to 5; it was soft, cream-coloured and lustrous, and practically free from broken seed and immature fibre.	Good, but a little irregular.	From 1·1 to 1·7 inch; mostly about 1·4 inch.	28d. (nominal)	

7th November, 1917.

Appendix 5.

IMPERIAL INSTITUTE OF THE UNITED KINGDOM, THE COLONIES AND INDIA.

Report on Robusta Coffee from Uganda.

The samples of Robusta Coffee which are the subject of this report were forwarded to the Imperial Institute by the Director of Agriculture and are referred to in his letter No. 678/302 dated the 27th August, 1917. The coffee was stated to have been grown and prepared on the Government Plantation, Kampala.

Description of Samples.

Six samples were forwarded, varying in weight from 4 to 10 oz., and all consisting of beans in the parchment. The beans were mostly oval and flat on one side, but a few rounded beans ("peaberries") were also present. The parchment was of a light straw-brown colour and in many cases showed brown discolourations, this being most noticeable in sample 4, whilst samples 3 and 6 were the cleanest in this respect.

Results of Examination.

The samples were examined at the Imperial Institute with the following results:—

No. of sample.	Percentage of parchment.	Percentage of bean.	Average weight of a single bean, in grams.	No. of beans required to fill a 50 c. c. measure.	Size of beans.	Colour of beans.	Description of seed coat.
1	11	89	0.13	232	Small	Opaque greyish-cream.	Light-brown, lightly adhering.
2	13	87	0.18	193	Fairly large to small	Grey with occasional small cream coloured opaque patches.	Dark brown, firmly adhering.
3	12	88	0.22	156	Fairly large to medium	Grey with cream coloured opaque patches.	Light-brown, lightly adhering.
4	11	89	0.13	282	Medium to very small	do	Light-brown, fairly firmly adhering.
5	14	86	0.14	253	do	do	Light-brown, firmly adhering.
6	12	88	0.15	233	do	Grey or opaque greyish-cream.	Light-brown, firmly adhering in some cases and lightly in others.

Commercial Valuation.

The samples were submitted for valuation to a firm of brokers, who furnished the following report:—

Sample 1 consisted of small and well-made beans but was rather over-dried, causing a bleached appearance which detracted from the value. The firm regarded the present value of the sample in London as about 72 shillings per cwt. (December, 1917).

Samples 2 and 3 represented good types of Robusta coffee, of first class quality for this variety and consisting of well-made beans. The value of such coffee in London would be about 80 to 85 shillings per cwt.

Samples 4 and 5 were small beans of good medium quality, and worth 70 to 75 shillings and 75 to 80 shillings per cwt. respectively in London.

Sample 6 was described as an almost wild coffee of a common variety, and uneven in curing, which would be worth about 60 to 65 shillings per cwt. in London.

Remarks.

The results show that these samples of Robusta coffee are of promising quality, and it would be desirable to forward larger samples (about 7 lbs.) to the Imperial Institute so that roasting trials can be made and the character of the liquor determined.

January, 1918.

Appendix 6.

IMPERIAL INSTITUTE OF THE UNITED KINGDOM, THE COLONIES AND INDIA.

Report on Robusta Coffee From Uganda.

The six samples of Robusta Coffee which are the subject of this report were forwarded to the Imperial Institute by the Director of Agriculture and are referred to in his letter No. 974/302A dated the 8th November, 1917. The coffee was stated to have been grown and prepared on the Government Plantation, Kampala.

Description of Samples.

The samples consisted of coffee berries in the parchment. The parchment was of light straw colour, clean and practically free from discolourations. The weights of the samples and the character of the beans after removal of the parchment are given in the following table:—

No. of Sample.	Label.	Weight. (oz.)	Size of Beans.	Description of seed-coat.
1	No. 10. Lot 3, 1917.	2	Medium	Light-brown, easily removed.
2	" 8. " 1, "	1 $\frac{1}{4}$	"	do.
3	" 20. " 1, "	1 $\frac{1}{2}$	Medium to small	Light-brown, rather hard to remove.
4	" 11. " 1, "	3 $\frac{1}{2}$	"	do.
5	" 5. " 3, "	1 $\frac{1}{2}$	"	Light-brown, easily removed.
6	" 4. " 3, "	1 $\frac{1}{2}$	"	do.

The colour of the beans after the parchment was removed was in each case grey with opaque cream patches.

The present samples as received in the parchment were of light colour, cleaner and of better appearance than the previous samples from the Government Plantation at Kampala which were the subject of Imperial Institute Report dated 16th January, 1918. The beans after removal of the parchment were also of better quality, and on the whole larger.

Commercial Valuation

The samples were submitted to a firm of Brokers in London, who described and valued them as follows (February, 1918):—

Sample.	Description.	Value per cwt.
1.	A good medium quality of well-grown beans ...	About 80s. to 85s.
2.	Similar to No. 1 but of slightly better quality ...	" 85s. to 90s.
3.	Fair, rather small beans, very green; apparently picked too early ...	" 70s. to 75s.
4.	Similar, but preferable in quality to No. 3, consisting of bolder beans and less unripe appearance ...	" 75s. to 78s.
5.	Similar to sample No. 2, but rather smaller ...	" 83s. to 88s.
6.	A good type of Uganda Plantation coffee, consisting of well-grown beans of good colour and fair size. A type of coffee always in demand in the London market ...	" 95s. to 100s.

The firm added that if larger samples of these coffees can be furnished they will be glad to carry out roasting trials in order to determine the character of the liquor produced.

Remarks

The report of the Brokers on these samples confirms the results of the examination of the previous samples forwarded in August, 1917 (*see* Imperial Institute Report dated 16th January, 1918), and indicates that the Robusta coffee grown at Kampala is of very promising quality. The valuations quoted above are abnormally high owing to war conditions, but there appears to be no doubt that the coffee would at all times be readily marketable in the United Kingdom at good prices.

Larger samples of the coffee should be forwarded to the Imperial Institute in due course, as already requested in Imperial Institute Report dated 16th January, 1918, so that they may be submitted to the Brokers for practical roasting and tasting trials.

9th April, 1918.

Appendix 7.

IMPERIAL INSTITUTE OF THE UNITED KINGDOM, THE COLONIES AND INDIA.

Report on Coffee from Uganda.

The eleven samples of coffee which are the subject of this report were forwarded to the Imperial Institute by the Director of Agriculture and are referred to in his letter No. 192/302 dated 8th February, 1918. The samples were stated to represent coffee grown on the Government Plantation at Kampala.

Description of Samples.

The samples, which varied in weight from $1\frac{1}{4}$ to $3\frac{1}{4}$ oz., were in good clean condition, and consisted of ungraded coffee berries in the parchment. Ten of the samples were stated to be derived from *Coffea robusta*, whilst the remaining sample was described as *Coffea* sp. cf. *eugenioides*. The berries were mostly oval in shape and flat on one side, but some "peaberries" were also present.

Results of Examination

The samples were examined at the Imperial Institute with the result shown in the following table:—

Sample.	Percentage of parchment coffee in berry.	Percentage of bean in berry.	DESCRIPTION OF BEANS AFTER THE REMOVAL OF PARCHMENT.			
			Average weight of a single bean.	Size of bean.	Colour of bean.	Description of Seed Coat.
(1) No. 11, Plot 1 ...	13	87	(Grams) 0·12	Small to medium	Opaque, greyish-cream	Light-brown and on the whole close-fitting; easily removed.
(2) No. 12, Plot 1 ...	10	90	0·17	Medium	Opaque, dull grey to creamy-grey	Greenish-grey and close-fitting.
(3) No. 16, Plot 1 ...	12	88	0·16	Medium	Opaque, dull grey to creamy-grey	Greenish-grey to brown and close-fitting.
(4) No. 17, Plot 1 ...	14	86	0·09	Very small	Opaque greyish-cream to grey	Light to medium brown, and close-fitting.
(5) No. 25, Plot 1 ...	15	85	0·12	Medium to small	Opaque, greyish-cream	Light-brown and mostly close-fitting; papery in some cases.
(6) No. 1, Plot 3 ...	15	85	0·11	Small to medium	Opaque greyish-cream to grey	Medium-brown and close-fitting.
(7) No. 3, Plot 3 ...	16	84	0·13	Medium	Opaque, dull grey to creamy-grey	Light-brown or silvery brown; fairly easy to remove.
(8) No. 16, Plot 3 ...	16	84	0·12	Medium to small	Opaque, dull grey to creamy-grey	Greenish-grey to brown with some discolourations; close-fitting.
(9) No. 9, Plot 3 ...	14	86	0·14	Medium	Opaque, greyish-cream to dull grey	Light-brown and in most cases easily removed; close-fitting in a few cases.
(10) No. 11, Plot 3 ...	18	82	0·14	Medium	Opaque, greyish-cream to dull grey	Light-brown; loose and easily removed.
(11) <i>Coffea</i> sp. cf. <i>eugenioides</i> .	19	81	0·05	Very small	Translucent, light greyish-cream	Almost colourless; very thin and close fitting.

Commercial Valuation.

The samples were submitted to a firm of brokers in London, who described and valued them as follows:—

Sample.	Description.	Value per cwt.
1. No. 11, Plot 1 ...	Low quality, rather small beans, rough and mixed with unripe beans.	68s. to 78s.
2. No. 12, Plot 1 ...	Fair-sized, even, and well grown beans, very green and probably picked rather too soon; the appearance indicates good quality.	78s. to 83s.
3. No. 16, Plot 1 ...	Generally similar to (2) (No. 12, Plot 1) above, but the discolouration noticeable on many of the beans indicates some sort of damage, probably caused during the process of curing.	70s. to 75s.
4. No. 17, Plot 1 ...	Beans similar to (1) (No. 11, Plot 1) above, but smaller.	65s. to 70s.
5. No. 25, Plot 1 ...	Fair quality, even beans, but rather rough and mixed with some unripe beans.	70s. to 75s.
6. No. 1, Plot 3 ...	A common and undesirable quality of rather small and rough beans.	60s. to 65s.
7. No. 3, Plot 3 ...	Fair quality of greenish colour, mixed with several defective beans.	70s. to 75s.
8. No. 6, Plot 3 ...	A common type and very low quality; rough and undesirable.	58s. to 63s.
9. No. 9, Plot 3 ...	Fair-sized beans, common and very rough, but mixed with a few beans of good quality.	63s. to 68s.
10. No. 11, Plot 3 ...	Rather small beans of fair and useful quality.	75s. to 80s.
11. <i>Coffea</i> sp. cf. <i>eugenioides</i>	Exceptionally small beans, smooth and well grown, and apart from the small size quite desirable and of good quality.	75s. to 85s.

The brokers stated that the samples were too small for roasting and liquor trials, so that the above report is based solely on the appearance of the raw coffee. They also expressed the opinion that when these coffees are husked in bulk by modern machinery the results will be more satisfactory.

With reference to the prices quoted for the different samples it may be stated that the current market values are 10s. to 15s. per cwt. higher than those usually obtaining before the war for this class of coffee.

Remarks.

With the exception of Nos. 6 and 9 (No. 1, Plot 3 and No. 6, Plot 3, respectively) these samples of coffee are of satisfactory character, and would be quite suitable for the United Kingdom market.

Appendix 8.

IMPERIAL INSTITUTE OF THE UNITED KINGDOM, THE COLONIES AND INDIA.

Report on Tea from Uganda.

The sample of tea which is the subject of this report was forwarded to the Imperial Institute by the Director of Agriculture at Kampala, and is referred to in his letter No. 855/217 dated 26th July, 1917. The tea was stated to have been grown and prepared on the Government Plantation, Kakumiro, Mubendi.

Description of Sample.

The sample weighed 17 oz., and consisted of manufactured brownish-black tea containing a good proportion of golden tip. The leaves were on the whole large and loosely rolled. A small amount of broken leaf and a few seeds were present in the sample.

Results of Examination.

The tea was chemically examined with the results shown in the following table, to which have been added for comparison the figures obtained for previous samples of tea from Uganda (see Imperial Institute reports dated 23rd January, 1914 and 5th September, 1914):—

				Present sample.	(1)	Previous samples from Uganda	
				per cent.	per cent.	(2) Golden Tip. per cent.	(3) Broken Leaf. per cent.
Expressed on the dry tea.	{	Moisture ...	...	11·2	8·1	8·8	8·8
		Caffeine ...	...	4·7	4·0	5·4	4·2
		Tannin ...	...	12·8	10·3	13·8	17·0
		Ash ...	...	6·2	5·2	4·6	5·3
		Extract (after infusion for 10 minutes)	...	32·2	39·1	38·6	38·4

The three earlier samples of tea from Uganda which were examined at the Imperial Institute varied somewhat in composition, and the present sample differs slightly from all of them. The percentages of moisture and ash are higher and the amount of extractive matter lower than in the previous cases, whilst the percentages of caffeine and tannin are approximately equivalent to the average of the earlier figures.

Uganda teas apparently tend to be rich in caffeine, as Indian teas usually contain only 3.5 to 4.0 per cent and China teas somewhat less. Apart however from the high percentage of caffeine and a somewhat higher percentage of tannin, the composition of the present sample resembles that of a number of Indian teas examined at the Imperial Institute (*see* figures quoted in Imperial Institute report dated 23rd January, 1914).

Commercial Valuation.

The tea was submitted for valuation to two firms of brokers who furnished the following reports:—

(1) One firm described the sample as unassorted leaf which judging from its appearance could be separated into useful and distinct grades, *i.e.*, Broken Orange Pekoe, Orange Pekoe, Pekoe, Broken Pekoe, Souchong and Pekoe Fannings. They stated that the tea contained a good deal of tip, which however was of too dull a colour, most likely owing to faulty fermentation. The smell of the tea was described as “dullish” and it was suggested that this was probably caused by overwithering and insufficient firing. The liquor was of useful colour but rather soft in taste, and the infused tea showed too many greenish un-fermented leaves. The tea was valued nominally at about 2s. 2d. per lb. in London (November, 1917).

(2) The second firm stated that the tea was very irregular in make and of uneven appearance, being composed of whole leaf, broken leaf, fannings and dust; there was, however, a good proportion of brightish golden tip. The tea was deficient in aroma and furnished a poor liquor, whilst the infused leaf was inclined to be greenish instead of a bright coppery red. The firm stated that the value of this tea was purely nominal, the only feature making it worth any price on the market being the tip, which would not raise its value beyond 1s. 3d. per lb. *under normal market conditions*. In order to be suitable for the market the tea would have to be properly sorted into various grades of whole and broken leaf.

Remarks.

From the results of this and the previous investigations of Uganda tea at the Imperial Institute there appears to be no reason why tea grown in the Protectorate, if properly fermented and graded, should not be readily marketable in the United Kingdom.

January, 1918.

Appendix 9.

IMPERIAL INSTITUTE OF THE UNITED KINGDOM, THE COLONIES AND INDIA.

Report on Loofahs from Uganda.

The sample of loofahs from Uganda which is the subject of this report was forwarded to the Imperial Institute by the Director of Agriculture and is referred to in his letter No. 411/509 dated 10th May, 1917. It was stated that the loofahs had been grown from seed imported from Japan by the Department.

Description of Sample.

The sample consisted of ten small loofahs, mostly about eight inches in length. The loofahs were clean and free from seed or pith, but of a rather darker tint than those usually marketed in the United Kingdom.

Commercial Valuation.

The loofahs were submitted for valuation to a firm of brokers, who stated that they were the best specimens grown outside Japan that they had seen, and that at the present time owing to scarcity of supplies consignments of similar loofahs would meet with a fairly ready sale at about 3s. 6d. to 4s. per 100 in London (August, 1917). The firm added however that it was doubtful whether loofahs of this small size could be remuneratively marketed in normal times.

Remarks.

The firm who valued the sample stated that loofahs exported from Uganda would have to be press-packed into bales of 5,000 in order to keep the freight down to a minimum, as otherwise it would not pay to ship them.

If loofahs of larger size than the present sample can be produced in Uganda, it would be desirable to forward representative specimens for further valuation.

21st August, 1917.

No. X/7/18.

ANALYTICAL LABORATORY,

NAIROBI,

28TH FEBRUARY, 1918.

DIRECTOR OF AGRICULTURE,
KAMPALA, UGANDA.**Mineral Specimen.**

Specimen labelled "So-called Chalk from Kiryango, Bunyoro District, Northern Province, Uganda," received from the Director of Agriculture, Kampala, Uganda, on the 9th instant.

Results of Examination:—The specimen is not chalk. It is essentially a hydrated silicate of alumina and mineralogically might be described as lithomarge.

It could be used in the manufacture of cement and for "loading" paper, but unless these industries were local it is very unlikely that the rock would pay freight for any great distance to a market.

V. H. KIRKHAM,

*Government Analyst, East Africa Protectorate.***Appendix 11.**

No. C.L.X/4/18.

ANALYTICAL LABORATORY,

NAIROBI,

20TH FEBRUARY, 1918.

Alcohol from Bananas.

Sample of Alcohol received on the 9th instant from the Acting Commissioner of Police Kampala, Uganda.

Result of Analysis:—

Absolute alcohol by weight	...	...	74.95%
do. by volume	...	...	81.24%
Reaction	...	...	neutral
Non-volatile residue	...	...	.0035%

Conclusions:—This spirit would require rectification for the ordinary industrial purposes, but if it is produced cheaply it might be commercially possible to export it in its present form, though it would obviously be desirable to rectify it on the spot to a strength of about 98% alcohol by weight.

V. H. KIRKHAM,

*Government Analyst, East Africa Protectorate.*THE ACTING COMMISSIONER OF POLICE,
KAMPALA, UGANDA.**Appendix 12****Comparative Statement of Exports from the Uganda Protectorate
for the year ended 31st March, 1918.**

ARTICLES	Unit	From 1st Apr., 1917 to 31st Mar., 1918.		From 1st Apr., 1916 to 31st Mar., 1917.		INCREASE		DECREASE	
		Quantity	£	Quantity	£	Quantity	£	Quantity	£
Cotton, Ginned	...	...	...	...	...	...	...	...	...
" Unginned	...	...	...	...	...	...	...	...	...
Coffee, Husked	...	...	...	...	...	...	...	...	...
" in Parchment	...	...	...	...	...	...	...	...	...
Rubber, Wild	...	...	...	...	...	...	...	...	...
" Plantation	...	...	...	...	...	...	...	...	...
Silk, Raw	...	...	...	...	...	...	...	...	...
Cacao	...	...	...	...	...	...	...	...	...
Chillies	...	...	...	...	...	...	...	...	...
Ground Nuts	...	...	...	...	...	...	...	...	...
Cotton Seed	...	...	...	...	...	...	...	...	...
Castor	...	...	...	...	...	...	...	...	...
Simsim	...	...	...	...	...	...	...	...	...
" Oil	...	...	...	...	...	...	...	...	...
Ghee (Clarified Butter)	...	...	...	...	...	...	...	...	...
Jaggree (Unrefined Sugar)	...	...	...	...	...	...	...	...	...
Hides	...	...	...	...	...	...	...	...	...
Skins, Goat	...	...	...	...	...	...	...	...	...
" Sheep	...	...	...	...	...	...	...	...	...
" Calf	...	...	...	...	...	...	...	...	...
" Miscellaneous	...	...	...	...	...	...	...	...	...
Horns	...	...	...	...	...	...	...	...	...
Hippo Teeth	...	...	...	...	...	...	...	...	...
Ivory	...	...	...	...	...	...	...	...	...
Timber	...	...	...	...	...	...	...	...	...
Animals, living	...	...	...	...	...	...	...	...	...
Miscellaneous Produce	...	...	...	...	...	...	...	...	...
Goods, Manufactured, unenumerated	...	...	...	...	...	...	...	...	...
" Unmanufactured	...	...	...	...	...	...	...	...	...
TOTALS	...	...	784,693	...	637,795	...	259,646	...	112,748

* Number.

Net Increase £146,898.

Comparative Statement of Exports from the Uganda Protectorate.

ARTICLES.	UNIT.	Year ended 31st March, 1914.		Year ended 31st March, 1915.		Year ended 31st March, 1916.		Year ended 31st March, 1917.		Year ended 31st March, 1918.	
		Quantity.	£	Quantity.	£	Quantity.	£	Quantity.	£	Quantity.	£
Cotton, Ginned	cwts.	85,217	272,366	107,139	320,456	91,231	239,483	77,961	348,880	99,395	537,083
" Unginned	"	44,130	45,321	30,188	30,660	8,110	5,943	32	34	282	548
Coffee, Husked	"	12,252	23,167	2,103	5,542	8,691	22,714	31,136	81,323	15,323	33,278
" Parchment	"	—	—	18,998	85,463	34,547	64,488	17,473	32,616	4,485	6,283
Rubber, Wild	"	93	1,107	—	—	49	554	4	40	84	923
" Plantation	"	174	2,934	197	1,838	467	4,362	643	5,856	1,292	9,965
" Raw	"	236	479	108	231	—	—	19	70	8	100
Cacao	"	—	—	—	—	1	405	258	562	114	138
Chillies	"	7,205	8,247	5,116	5,835	8,333	16,850	13,317	27,328	9,287	18,586
Ground Nuts	"	7,671	3,740	156	76	1,693	822	3,640	1,767	954	464
Cotton Seed...	"	134,128	13,499	180,334	18,172	104,498	9,760	109,213	10,220	44,021	7,402
Castor Seed...	"	—	—	—	—	—	—	—	—	329	171
Simsim Seed	"	17,919	10,449	8,514	4,764	39,261	21,956	38,090	21,318	17,337	13,048
" Oil	"	36	71	3	6	134	250	387	725	230	530
Cotton Seed Oil	"	—	42	3	17	725	870	—	—	—	—
Beeswax	"	8	—	—	—	—	2	—	—	—	—
Ghee (Clarified Butter)...	"	4,851	12,507	4,693	12,264	4,591	11,999	7,007	18,310	7,090	23,270
Jaggree (Unrefined Sugar)	"	216	193	265	159	551	329	520	310	851	668
Hides	"	13,637	52,926	16,148	54,917	18,211	64,480	19,131	52,693	22,634	76,707
Skins, Goat	"	*464,987	29,037	*364,348	19,091	*391,290	18,260	*398,448	16,095	2,273	6,789
" Sheep	"	*59,644	1,615	*22,178	506	*10,144	169	*9,380	126	46	41
" Calf	"	1,052	4,204	732	2,710	612	2,227	127	345	—	—
" Miscellaneous	lbs.	—	—	—	—	—	—	—	—	106	10
Horns	"	6,586	71	221	3	12	4	44	15	40	1
Hippo Teeth	"	11,486	766	5,260	414	2,818	251	4,800	422	2,336	156
Ivory	"	45,870	23,678	12,246	6,283	30,641	11,091	22,876	8,778	109,426	43,770
Timber	"	2,171	766	1,337	585	419	154	533	567	778	411
Animals, Living	cwts.	1,991	1,991	404	920	1,179	3,467	1,865	6,131	41	118
Miscellaneous Produce...	No.	1,282	392	714	714	—	1,697	—	1,371	—	2,331
Goods Manufactured, unenumerated	value.	—	1,529	—	934	—	803	—	1,450	—	1,892
Goods Unmanufactured, unenumerated	"	—	582	—	558	—	261	—	443	—	10
GRAND TOTAL	...	...	511,679	—	523,173	—	503,631	—	637,795	—	784,693

* Number.

**Statement of Exports—the Produce of the Uganda Protectorate—showing Quantities and Values
from the various Ports and Stations, for the Year ended 31st March, 1918.**

ARTICLES.	UNIT.	BUKAKATA.		ENTEBBE.		KAMPALA.		KIBANGA.		JINJA.		MJANIL.		OTHER PORTS AND STATIONS.		TOTAL.	
		Quantity	£	Quantity	£	Quantity	£	Quantity	£	Quantity	£	Quantity	£	Quantity	£	Quantity	£
Cotton, Ginned	... cwt.	—	—	144	750	23,174	125,119	—	—	51,420	284,857	—	—	24,657	126,357	99,395	537,083
" Unginned	... "	—	—	—	—	—	—	—	—	—	—	—	—	—	—	282	548
Coffee, Husked	... "	956	2,077	623	1,303	8,795	20,242	3,243	5,625	1,721	3,986	282	—	24	45	15,362	33,278
" in Parchment	... "	—	—	431	677	3,739	5,202	—	—	255	354	—	—	60	50	4,485	6,283
Rubber, Wild	... "	—	—	—	—	—	—	—	—	84	923	—	—	—	—	84	923
" Plantation	... "	—	—	212	1,583	566	4,332	15	112	499	3,938	—	—	—	—	1,292	9,965
Silk, Raw	... lbs.	—	—	—	—	900	100	—	—	—	—	—	—	—	—	900	100
Cacao	... cwt.	—	—	39	45	3	5	—	—	72	88	—	—	—	—	114	138
Chillies	... "	—	—	—	—	715	1,419	—	—	8,502	17,020	—	—	70	147	9,287	18,586
Ground Nuts	... "	—	—	—	—	—	—	—	—	605	295	349	169	—	—	954	464
Cotton Seed	... tons	—	—	34	64	759	2,479	—	—	955	2,696	14	70	439	2,093	2,201	7,402
Castor Seed	... cwt.	—	—	—	—	229	119	—	—	—	—	—	—	—	—	229	119
Simsim Seed	... "	—	—	—	—	—	—	—	—	6,066	4,585	1,942	—	9,330	7,087	17,338	13,048
Simsim Oil	... "	—	—	—	—	3	6	—	—	216	496	—	—	11	28	230	530
Ghee (Clarified Butter)	... "	3,259	11,113	78	273	3,106	9,878	—	—	291	981	284	789	72	236	7,090	23,270
Jaggree (Unrefined Sugar)	... "	—	—	374	292	36	27	—	—	441	349	—	—	—	—	851	668
Hides	... "	2,392	7,288	26	66	9,294	31,864	—	—	8,647	29,685	2,255	7,751	20	53	22,634	76,707
Skins, Goat	... "	30	99	—	—	1,061	3,210	—	—	953	2,828	212	603	17	49	2,273	6,789
" Sheep	... "	2	1	—	—	18	16	—	—	20	18	2	2	4	4	46	41
" Miscellaneous	... lbs.	—	—	—	—	96	8	—	—	—	—	10	2	—	—	106	10
Horns	... "	—	—	—	—	40	1	—	—	—	—	—	—	—	—	40	1
Hippo Teeth	... "	70	5	127	8	499	33	—	—	948	64	692	46	—	—	2,336	156
Ivory	... "	555	222	—	—	94,209½	37,684	—	—	3,442	1,376	172	69	11,048	4,419	109,426½	43,770
Timber	... "	—	—	63	30	715	381	—	—	—	—	—	—	—	—	778	411
Animals, Living	... cwt.	—	—	—	—	6	1	—	—	—	—	35	117	—	—	41	118
Miscellaneous Produce	... cwt.	44	40	145	79	511	504	—	—	1,503	630	2,423	941	477	189	5,103	2,383
Goods Manufactured, Unenumerated	... "	108	362	8	11	401	1,438	—	—	7	20	2	1	16	60	542	1,892
" Unmanufactured	... "	—	—	15	1	3	2	—	—	7	6	2	1	—	—	27	10
GRAND TOTALS	...	—	21,207	—	5,182	—	244,070	—	5,737	—	355,195	—	12,485	—	140,817	—	784,693

All Produce from other Ports and Stations passes through Jinja Port.

Appendix 15

Details of Exports from other Ports and Stations are as follows:—

PORT OR STATION.	COTTON GINNED.		COFFEE, HUSKED.		COFFEE, PARCMENT.		CHILLIES.		COTTON SEED.		SIMSIM.		SIMSIM OIL.		GHEE.		HIDES.		SKINS, GOAT.		SKINS, SHEEP.		IVORY.		MISCELLANEOUS PRODUCE.		GOODS MANUFACTURED, UNENUMERATED.	
	Cwts.	£	Cwts.	£	Cwts.	£	Cwts.	£	Tons.	£	Cwts.	£	Cwts.	£	Cwts.	£	Cwts.	£	Cwts.	£	Cwts.	£	lbs.	£	Cwts.	£	Cwts.	£
Luzinga ...	...	...	...	...	...	...	18	37	...	...	...	...	...	...	...	...	...	...	...	...	4	4	...	...	...	...	...	...
Mbulamui ...	6,518	31,625	24	45	60	50	16	34	43	213	...	...	...	...	66	212	...	...	7	20	...	...	...	...	...	...	...	...
Namasagali ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	6	24	2	5	...	...	...	...	...	...	2	1	...	...
Rwampanga	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1,881	752	...	...	...	...
Masindi Port	...	...	...	...	...	...	36	76	...	...	...	...	...	...	...	...	18	48	5	17	...	...	9,167	3,667	...	...	16	60
Atura ...	...	...	...	...	...	...	...	...	...	...	7,897	6,012	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Palango ...	...	...	...	...	...	...	...	...	...	...	125	98	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Kelle ...	...	...	...	...	...	...	...	...	...	...	1,098	820	11	28	...	...	...	...	5	12	...	...	...	474	187	...	...	...
Bululu ...	...	...	...	...	...	...	...	...	...	...	210	157	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Lalli ...	7,112	36,163	...	...	...	...	...	...	319	1,493	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Bugondo ...	6,878	37,177	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	...	...	...
Agu ...	4,149	21,392	...	...	...	...	...	...	5	25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Gogonyo ...	...	...	...	...	...	...	...	...	72	362	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
TOTALS	24,657	126,357	24	45	60	50	70	147	439	2,093	9,330	7,087	11	28	72	236	20	53	17	49	4	4	11,048	4,419	477	189	16	60

N.B.—All Produce from the above Ports and Stations passes through Jinja Port.

ENTEBBE METEOROLOGICAL STATEMENT FOR THE YEAR 1917.

Lat. 0° 4' 31" N. Long. 32° 28' 30" E. Height of Barometer above M. S. L. 3342 Feet.

		At 7 A.M.				At 2 P.M.				At 9 P.M.			
MONTH.		Barometer corrected to 32° F.	Attached Thermometer.	Dry Bulb.	Wet Bulb.	Barometer corrected to 32° F.	Attached Thermometer.	Dry Bulb.	Wet Bulb.	Barometer corrected to 32° F.	Attached Thermometer.	Dry Bulb.	Wet Bulb.
		In.	°	°	°	In.	°	°	°	In.	°	°	°
1917.													
JANUARY	...	26.164	69.1	67.5	65.4	26.119	81.1	78.5	76.1	26.145	69.3	67.9	65.5
FEBRUARY	...	26.169	68.2	66.9	64.8	26.122	80.8	76.3	72.7	26.129	68.6	67.4	64.7
MARCH	...	26.155	70.0	69.0	66.9	26.113	81.2	78.3	75.8	26.133	70.4	69.0	66.9
APRIL	...	26.183	69.5	67.7	64.3	26.162	77.5	75.4	71.3	26.168	71.1	69.0	65.3
MAY	...	26.178	68.8	64.1	63.3	26.151	78.9	76.4	71.9	26.156	69.4	67.7	64.0
JUNE	...	26.192	70.2	68.1	64.9	26.162	78.4	76.2	70.7	26.160	70.3	68.4	64.6
JULY	...	26.223	69.2	67.2	64.1	26.200	80.3	78.1	72.6	26.210	71.5	69.9	66.5
AUGUST	...	26.218	69.4	66.9	63.9	26.177	80.4	76.6	72.1	26.187	69.5	67.6	64.1
SEPTEMBER	...	26.190	69.3	67.2	63.9	26.158	79.6	77.8	72.3	26.173	70.3	68.3	64.4
OCTOBER	...	26.194	70.2	68.4	64.5	26.149	79.9	78.8	72.2	26.161	69.8	67.8	63.0
NOVEMBER	...	26.181	70.6	68.8	65.5	26.153	79.6	78.0	73.8	26.165	71.7	69.5	66.6
DECEMBER	...	26.218	70.8	68.8	64.9	26.181	79.1	77.3	71.8	26.177	71.9	69.7	64.9
MEAN FOR YEAR	...	26.189	69.6	67.4	64.7	26.154	79.7	77.3	72.8	26.164	70.3	68.5	65.0
										TOTAL			
										79.7	63.2	5.22	55.58
												122	

**Statement of Extra Meteorological Observations taken
at Entebbe.**

MONTH.				Solar Radiation Thermometer.		Terrestrial Radiation Minimum Thermometer.
				Black 2 P.M.	Bright.	
1917.				°	°	°
JANUARY	...	...	...	124.1	96.7	52.6
FEBRUARY	...	...	...	123.8	94.2	50.8
MARCH	...	...	...	121.7	95.1	51.7
APRIL	...	...	...	123.2	94.4	45.6
MAY	...	...	...	121.4	95.6	48.2
JUNE	...	...	...	125.3	94.8	51.4
JULY	...	...	...	127.3	96.4	43.8
AUGUST	...	...	...	123.8	97.1	43.8
SEPTEMBER	...	...	...	124.4	96.1	43.8
OCTOBER	...	...	...	123.6	96.5	44.0
NOVEMBER	...	...	...	127.8	95.7	44.2
DECEMBER	...	...	...	129.2	97.0	42.9
MEAN FOR YEAR				124.6	95.8	46.9

**Statement of Extra Meteorological Observations taken
at Entebbe.**

MONTH.				Earth Thermometer 1½ feet.			Earth Thermometer 4 feet.		
				7 A.M.	2 P.M.	9 P.M.	7 A.M.	2 P.M.	9 P.M.
1917.				°	°	°	°	°	°
JANUARY	...	...	...	74.5	74.5	74.6	75.1	75.2	75.2
FEBRUARY	...	...	...	73.4	73.5	73.5	74.7	74.7	74.7
MARCH	...	...	...	75.4	75.5	75.5	75.5	75.7	75.7
APRIL	...	...	...	74.0	74.0	74.0	74.9	72.0	72.2
MAY	...	...	...	75.8	75.9	76.0	75.9	76.0	76.2
JUNE	...	...	...	74.1	74.4	74.2	75.2	75.2	75.2
JULY	...	...	...	74.6	74.4	74.4	75.2	75.2	75.9
AUGUST	...	...	...	73.1	73.2	73.3	74.3	74.4	74.3
SEPTEMBER	...	...	...	74.7	74.7	74.9	75.5	75.8	75.7
OCTOBER	...	...	...	75.8	76.0	76.0	76.2	76.4	76.4
NOVEMBER	...	...	...	75.3	75.2	75.2	75.4	75.4	75.4
DECEMBER	...	...	...	75.3	75.3	75.3	75.8	75.9	76.1
MEAN FOR YEAR				75.1	75.2	75.2	74.9	74.7	74.7

**Statement Showing Average Hourly Velocity of Wind
for 1917 between the Hours of:—**

MONTH.				9 P.M. TO 7 A.M.	7 A.M. TO 2 P.M.	2 P.M. TO 9 P.M.
1917.						
JANUARY	...	...	...	3.2	2.7	2.2
FEBRUARY	...	...	...	2.9	2.2	2.1
MARCH	...	...	...	3.1	2.3	1.9
APRIL	...	...	...	2.4	3.0	3.8
MAY	...	...	...	3.2	2.9	4.0
JUNE	...	...	...	2.7	2.3	3.5
JULY	...	...	...	2.7	2.2	2.6
AUGUST	...	...	...	2.1	2.3	2.4
SEPTEMBER	...	...	...	3.2	3.4	2.8
OCTOBER	...	...	...	2.5	2.3	2.1
NOVEMBER	...	...	...	2.5	2.4	2.3
DECEMBER	...	...	...	2.5	2.3	2.2
MEAN FOR YEAR				2.7	2.5	2.7

Entebbe Rainfall Statistics for 22 Years, from 1896 to December, 1917.

M O N T H.	1896.		1897.		1898.		1899.		1900.		1901.		1902.		1903.		1904.		1905.		1906.	
	In.	No.	In.	No.	In.	No.	In.	No.	In.	No.	In.	No.	In.	No.	In.	No.	In.	No.	In.	No.	In.	No.
JANUARY	...	...	1.74	5	...	...	0.61	4	2.26	...	3.88	9	2.96	7	6.53	10	1.66	6	2.16	9	2.83	4
FEBRUARY	...	...	3.62	15	...	...	3.46	7	4.23	...	4.11	7	7.35	10	0.70	4	3.60	9	0.70	3	4.98	13
MARCH	...	...	3.97	16	...	...	3.45	9	6.10	...	4.33	16	3.65	9	7.10	17	9.85	24	9.39	18	5.19	18
APRIL	...	...	8.61	18	...	...	9.15	12	13.54	...	8.40	19	5.78	12	8.69	19	6.77	20	5.43	23	14.62	22
MAY	...	...	4.45	15	...	...	8.56	14	2.70	...	7.94	20	4.15	14	6.90	17	9.52	21	8.24	22	4.80	13
JUNE	...	...	3.18	8	...	...	4.53	11	5.81	...	5.57	...	1.09	3	10.26	17	5.38	13	6.66	12	5.08	21
JULY	...	...	0.31	5	...	...	2.89	10	0.65	...	4.01	7	3.35	9	4.23	18	1.79	5	5.67	11	1.66	5
AUGUST	...	...	4.10	12	...	...	5.86	10	4.47	...	0.18	2	2.85	8	1.18	6	4.17	12	1.73	4	6.04	11
SEPTEMBER	...	...	2.37	5	...	...	4.74	7	3.43	...	0.66	6	5.61	8	4.45	15	2.34	8	4.27	4	2.50	10
OCTOBER	...	...	4.59	11	...	...	...	...	1.53	...	1.94	12	4.98	18	3.63	10	2.58	11	6.50	13	4.86	10
NOVEMBER	...	...	12.05	25	...	...	...	...	5.99	...	2.28	8	7.76	14	3.74	8	8.01	22	7.63	19	2.25	8
DECEMBER	...	...	4.69	10	...	...	...	...	12.51	...	3.72	9	3.77	14	5.47	6	7.34	13	7.36	17	4.61	12
TOTAL	...	...	44.35	109	...	...	32.57	61	61.44	...	47.02	115	53.30	121	62.88	142	63.01	164	65.74	145	59.42	147

M O N T H.	1907.		1908.		1909.		1910.		1911.		1912.		1913.		1914.		1915.		1916.		1917.	
	In.	No.	In.	No.	In.	No.	In.	No.	In.	No.	In.	No.	In.	No.	In.	No.	In.	No.	In.	No.	In.	No.
JANUARY	3.43	10	1.17	4	1.89	7	7.99	11	2.66	8	3.55	8	0.63	7	2.02	10	2.56	7	0.74	8	2.86	8
FEBRUARY	2.42	8	3.41	10	1.44	6	0.86	4	0.26	2	3.59	10	7.32	15	3.19	10	3.40	8	5.95	12	8.31	14
MARCH	0.83	4	2.32	6	5.60	10	7.34	17	5.98	19	8.61	18	9.51	15	6.63	21	9.87	17	5.63	11	2.19	3
APRIL	15.79	23	11.82	18	12.09	19	8.85	19	12.38	21	7.55	18	12.71	25	9.31	16	10.30	17	5.92	15	13.30	23
MAY	10.00	17	10.34	18	5.96	9	15.80	21	10.86	15	12.03	18	10.64	26	7.71	19	7.85	24	3.96	11	9.90	19
JUNE	6.26	6	3.63	11	2.67	6	4.70	4	1.34	7	9.81	15	0.97	10	5.28	15	6.84	13	9.78	15	2.85	7
JULY	5.72	11	5.04	9	2.86	7	2.06	8	2.95	6	2.61	9	3.22	6	2.85	8	2.88	6	3.16	7	0.02	1
AUGUST	0.55	3	2.90	8	3.36	11	2.27	6	6.60	7	6.75	17	1.41	6	3.10	8	1.68	12	4.53	12	1.50	13
SEPTEMBER	2.45	3	0.93	3	2.49	8	1.08	10	1.97	7	2.08	7	1.71	5	4.58	8	5.22	6	4.44	12	5.32	12
OCTOBER	2.70	15	3.52	13	4.47	11	1.51	5	2.07	8	0.96	14	4.42	13	3.42	12	5.38	10	3.04	7	5.56	10
NOVEMBER	3.43	10	2.42	12	3.91	6	3.39	9	4.02	14	8.22	18	0.90	11	8.53	20	4.45	14	3.50	9	2.71	6
DECEMBER	4.67	5	4.27	11	8.69	16	6.42	13	1.86	6	9.95	20	2.98	10	3.15	10	9.42	13	3.68	8	1.06	6
TOTAL	58.25	115	51.77	123	55.43	116	62.27	127	52.91	120	75.71	172	56.42	149	59.77	157	69.85	147	54.33	127	55.58	122

**Average Maximum and Minimum Temperatures for Various
Periods of Eight Stations.**

YEAR.	ENTEBBE.		JINJA.		MBARARA.		MASAKA.		FORT PORTAL.		KAMPALA.		GULU.		MASINDI.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
1911 ...	78·6	61·9	82·5	62·3	78·9	61·2	80·7	60·2	82·2	63·3	82·5	62·1	...	...	...	...
1912 ...	79·1	62·9	81·8	63·5	78·5	61·7	80·4	60·0	82·2	62·1	82·0	63·0	85·7	70·0	...	...
1913 ...	79·7	62·7	82·8	61·8	80·1	63·6	78·0	56·2	77·9	56·3	82·7	62·6	83·3	63·2	87·0	62·6
1914 ...	78·6	63·4	81·4	62·8	80·6	53·4	77·0	58·2	78·6	54·3	81·0	65·8	84·3	62·4	88·6	62·4
1915 ...	79·5	63·3	82·2	62·6	80·6	48·3	77·0	60·4	77·7	58·4	80·3	64·6	84·6	60·7	85·4	61·5
1916 ...	78·8	63·0	80·4	61·6	79·4	47·8	76·4	61·3	76·1	58·4	80·1	63·4	86·0	62·1	84·5	56·7
1917 ...	79·7	63·2	81·9	61·4	79·4	55·7	76·3	58·9	75·9	57·0	79·6	62·0	86·7	59·1	83·8	61·7
MEANS ...	79·1	62·9	81·9	62·3	79·6	56·0	78·0	59·3	78·7	58·5	81·2	63·4	85·1	62·91	85·86	60·98

**Average Rainfall for Seven Years of Thirty Stations, Six Years
of Four Stations and Five Years of Three Stations.**

Year.	Entebbe.	Jinja.	Mbarara.	Masaka.	Fort Portal.	Butiaba.	Masindi.	Kampala.	Mbale.	Budo.
	In. Cts.	In. Cts.	In. Cts.	In. Cts.	In. Cts.	In. Cts.	In. Cts.	In. Ctr.	In. Cts.	In. Cts.
1911 ...	62·91	50·17	28·87	34·98	51·06	27·97	64·96	41·66	58·80	42·42
1912 ...	75·71	47·32	35·16	30·43	53·13	43·15	48·34	56·76	54·67	50·10
1913 ...	56·42	41·53	20·93	25·08	53·08	27·34	55·00	45·60	47·19	43·14
1914 ...	59·77	54·50	28·57	32·94	61·85	34·81	53·39	56·14	54·18	47·83
1915 ...	69·85	49·56	31·23	26·42	48·35	29·73	50·34	47·15	39·88	41·19
1916 ...	54·33	50·87	31·67	23·60	67·84	38·58	54·91	46·54	45·27	53·44
1917 ...	55·58	52·88	36·41	34·03	66·07	32·88	67·59	55·60	65·83	48·80
MEANS ...	62·08	49·55	30·41	29·64	57·34	32·07	56·36	49·92	52·26	46·70

Year.	Bukona.	Namukera.	Iganga.	Butiti.	Bukumi.	Rubaga.	Ngora.	Kisubi.	Hoima.	Kivuvu.
	In. Cts.	In. Cts.	In. Cts.	In. Cts.	In. Cts.	In. Cts.	In. Cts.	In. Cts.	In. Cts.	In. Cts.
1911 ...	37·43	48·03	51·83	46·47	43·08	48·85	46·99	48·48	44·98	51·34
1912 ...	61·44	52·10	45·58	41·91	51·86	55·48	55·44	66·37	55·89	50·15
1913 ...	52·69	32·93	52·55	35·00	33·07	44·45	53·81	52·39	55·25	46·26
1914 ...	54·04	51·58	57·79	69·95	51·96	51·28	61·43	51·01	61·53	53·19
1915 ...	62·73	41·52	60·36	51·12	37·95	50·71	55·87	53·81	48·97	55·13
1916 ...	56·67	54·89	54·87	57·96	40·11	44·67	56·99	51·62	71·08	58·62
1917 ...	61·35	56·97	65·85	61·23	*17·50	45·15	64·98	48·48	82·23	66·32
MEANS ...	55·19	48·29	55·55	51·95	39·36	48·66	56·50	53·17	59·99	54·29

Year.	Nandere.	Moniko.	Mubendi.	Gulu.	Name-nage.	Magigye.	Bwavu.	Kakumiro.	Bunya-raguru.	Katigondo.
	In. Cts.	In. Cts.	In. Cts.	In. Cts.	In. Cts.	In. Cts.	In. Cts.	In. Cts.	In. Cts.	In. Cts.
1911 ...	46·59	45·54	42·93	...	...	...	...	...	...	...
1912 ...	57·30	53·61	46·28	65·07	51·29	47·87	51·55	...	...	...
1913 ...	44·08	47·36	43·89	48·79	32·99	36·61	51·02	35·65	48·53	34·26
1914 ...	50·08	55·36	52·09	58·07	43·72	54·28	63·47	53·11	63·19	42·30
1915 ...	49·44	57·00	45·33	64·55	52·70	57·39	53·14	46·59	58·19	40·05
1916 ...	49·22	55·96	46·18	73·41	68·50	61·38	57·62	58·07	50·01	41·25
1917 ...	57·64	58·54	44·56	69·91	54·73	54·39	61·73	59·13	77·70	43·74
MEANS ...	50·62	53·34	45·89	63·03	50·65	51·98	56·42	50·51	59·52	40·32

* Record for 7 months only.

Statement showing Situations and Latitudes, Longitudes and Heights of the Meteorological Stations in the Uganda Protectorate.

<i>Station.</i>	<i>Situation.</i>	<i>Latitude.</i>	<i>Longitude.</i>	<i>Height in feet above Mean Sea Level</i>
Entebbe	Buganda Kingdom	0° 4' 31" N.	32°28'30" E.	3842
Butiaba	Northern Province	1°50' N.	31°26' E.	2025
Fort Portal	Western "	0°43' N.	30° 8' E.	5299
Gondokoro †	Northern "	4°51' N.	31°42' E.	1500
Jinja	Eastern "	0°26' N.	33°11' E.	3722
Mubendi	Buganda Kingdom	0°30' 26" N.	31°22'22" E.	5121
Kampala	" "	0°19' N.	32°35' E.	3905
Koba †	Northern Province	2°19' N.	31°29' E.	*
Masaka	Buganda Kingdom	0°21' S.	31°47' E.	4150-4250
Masindi	Northern Province	1°40' N.	31°50' E.	3764
Mbale	Eastern "	1° 2' N.	34° 6' E.	*
Mbarara	Western "	0°31' S.	30°47' E.	4500
Namenage	Eastern "	0°51' N.	33°10' E.	3600-3800
Nimule †	Northern "	3°39' N.	32°10' E.	2034
Sunga †	Buganda Kingdom	0°19' S.	31°52' E.	3910
Budo	" "	0°16' N.	32°29' E.	4200-4300
Bukona	Eastern Province	0°30' N.	33°37' E.	*
Bululu †	" "	1°43' N.	33°13' E.	3518
Kumi †	" "	1°29' N.	33°58' E.	*
Palango †	" "	1°58' N.	32°30' E.	*
Hoima	Northern Province	1°30' N.	31°30' E.	3801
Busubizi †	Buganda Kingdom	0°22' N.	32° 5' E.	*
Nazigo †	" "	*	*	*
Namukekera	" "	0°41' N.	32°14' E.	*
Nabumali †	Eastern Province	1°	34°12' E.	*
Iganga	" "	0°36' N.	32°28' E.	*
Butiti	Western "	0°39' N.	30°32' E.	*
Kamuli †	Eastern "	0°55' N.	33° 7' E.	3717
Bukumi	Buganda Kingdom	0°49' N.	31°22' E.	*
Mitala Mariya †	" "	0° 5' N.	32° 7' E.	*
Rubaga	" "	0°18' N.	32°33' E.	4135
Ngora	Eastern Province	1°28' N.	33°48' E.	*
Kisubi	Buganda Kingdom	0°10' N.	32°33' E.	*
Kivuvu	" "	0°23' N.	32°47' E.	3600-3700
Kawalongojo	" "	0°24' N.	32°11' E.	4263
Gulu	Northern Province	2°45' N.	32°25' E.	*
Nabieso †	Eastern "	1°52' N.	32°52' E.	*
Magigye	Buganda Kingdom	0°29' N.	32°36' E.	*
Nandere	" "	0°38' N.	32°30' E.	3900 (approx.)
Moniko	" "	0°23' N.	32°55' E.	*
Keritia	" "	0°21' N.	32°51' E.	*
Bwavu	" "	0°21' N.	33° 1' E.	4200 (approx.)
Bombo	" "	0°35' N.	32°32' E.	3967 (approx.)
Bugalla †	" "	0°19' S.	32°14' E.	4070
Sango Bay	" "	0°52' N.	31°42' E.	*
Kakumiro	" "	0°46' N.	31°18' E.	4511
Bunyaruguru	" "	*	*	*
Mvuba †	" "	0°24' N.	32°17' E.	3800-3900
Kitumbuzi River	Eastern Province	*	*	*
Kabyaza	" "	*	*	*
Kadoma	" "	*	*	*
Masindi Port	Northern "	1°42' N.	32°05' E.	3360
Nambeya	Buganda Kingdom	0°38' N.	32°20' E.	4000
Kitalya †	" "	0°26' N.	32°14' E.	3800
Lugombe †	" "	0°26' N.	32°14' E.	3800
Katigondo	" "	0°13' S.	31°44' E.	4290
Kitgum	Eastern Province	3°20' N.	32°55' E.	*
Soroti	" "	1°43' N.	33°37' E.	3690
Lira	" "	2°15' N.	32°55' E.	*
Nyondo	" "	*	*	*
Kilchooney	Western "	*	*	*
Hoima River	" "	*	*	*
Estate	Northern "	*	*	*
Namasagali	Eastern "	*	*	*
Kadunguru	" "	*	*	*
Ndibulungi	Buganda Kingdom	32°05'03" E.	00°23'00" N.	4200
Sisa	" "	32°29'54" E.	00°10'28" N.	4100
Kabale	Western Province	29°59'28" E.	01°15'00" S.	*

* Information not available.

† These Stations have been abandoned.

NOTE.—The above statement has been revised, as far as possible, by the Survey Department. There is no definite information available as to Latitude and Longitude of these points, except Entebbe and Kampala.

